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BLISTER RUST WORK

IN THE FAR WEST

January 1 to December 31, 1925

Spokane Branch
Office of Blister Rust Control,
616 Realty Building
Spokane, Washington

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INTRODUCTION

The following report will cover the activities of the western branch of the Office of Blister Rust Control, Bureau of Plant Industry, for the period January 1, 1925 to December 31, 1925. The general situation in regard to the status of the rust prior to the 1924 season was briefly expressed in the report of this office for the calendar year 1924, and is quoted as follows:

Blister rust was found for the first time in the West at Vancouver, B. C., in the autumn of 1921. The work of this Office during 1922 consisted largely of scouting for the limits of infection of the disease, and the eradication of the cultivated black currant. During that season it was found that the disease had spread quite generally over the Puget Sound region, and as far south as the Columbia River. A secondary and geographically separate focus of infection was found to exist in eastern British Columbia, from Sicamous and Canoe eastward to Revelstoke and Beaton.

The season of 1923 was notable principally for the spread of infection southward through the dry belt of central British Columbia and through the lake region of eastern British Columbia. Infection on cultivated black currants was found to be generally scattered over the dry belt, and extended as far south as the central part of Okanogan County, Washington. Infection in eastern British Columbia was found to have extended southward to Grand Forks, British Columbia, Danville, Ferry County, Washington, and to Nelson, British Columbia.

It was also found that numerous Ribes were each year infected in the Puget Sound region of western Washington. Their proximity to native white pines made it probable that these pines were becoming infected.

In general, at the end of the 1923 field season, the Idaho white pine belt was directly threatened with invasion from the northwest, through the dry belt, and from the north, through Nelson, British Columbia, and nearby points. Also, the increase of infection in western Washington constituted an ever-increasing menace of infection in western Oregon.

The season of 1924 showed practically no extension of the known distribution of the rust in the West. The summer season was dry and hot, with very little rain. These conditions militated against the spread

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The season of 1924 showed practically no extension of the known distribution of the rust in the West. The summer season was dry and hot, with very little rain. These conditions militated against the spread

of the rust. In many cases, localities and even actual Ribes bushes known to have harbored the disease in 1923 were found to be free from it in 1924. For this reason, the known distribution of the rust at the close of the 1924 season was practically identical with that at the end of 1923.

The work of the Spokane office for the period January 1, 1925 to June 30, 1925, was conducted under the Federal Appropriation of $125,000 for the fiscal year 1925; the work for the period July 1, 1925 to December 31, 1925 under the Federal Appropriation of $140,000 for the fiscal year 1926. Both of these appropriations were for the western blister rust control program only. The appropriations for these two fiscal years were allotted by the Secretary of Agriculture as follows:

Allotment of Funds, Fiscal Year 1925.

Project	Period July 1, 1924 to June 30, 1925.
1. For application of general control measures to delay the spread of the rust including location and eradication of cultivated black currants, blister rust quarantine inspection work, nursery sanitation, etc.	$35,815.00
2. For development of local control practices by testing and improving methods of control reconnaissance, the physical and chemical destruction of Ribes and determining the ecological factors effecting local control	20,603.00
3. For application of local control including control reconnaissance and eradication of Ribes on Federal lands	33,649.00
4. For field studies and collection of field data on spread of rust, damage to pine, etc.	6,695.00
5. For scientific investigation of the behavior of the rust under western conditions.	12,000.00
6. For miscellaneous expenses, including supervision, supplies, clerical assistance, etc.	12,483.00
7. For reserve	3,750.00
Total	$125,000.00

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Allotment of Funds, Fiscal Year 1925.

Project	Period July 1, 1924 to June 30, 1925.
1. For application of general control measures to delay the spread of the rust including location and eradication of cultivated black currants, blister rust quarantine inspection work, nursery sanitation, etc.	$25,815.00
2. For development of local control practices by testing and improving methods of control reconnaissance, the physical and chemical destruction of Ribes and determining the ecological factors affecting local control	[illegible]
3. For application of local control including control reconnaissance and eradication of Ribes on Federal lands	33,649.00
4. For field studies and collection of field data on spread of rust, damage to pine, etc.	6,695.00
5. For scientific investigation of the behavior of the rust under western conditions.	12,000.00
6. For miscellaneous expenses, including supervision, supplies, clerical assistance, etc.	[illegible]
7. For reserve	4,750.00
Total	$125,000.00

Allotment of Funds, Fiscal Year 1926.

Project	Period July 1, 1925 to June 30, 1926.
1. For application of general control measures to delay the spread of the rust including location and eradication of cultivated black currants, blister rust quarantine inspection work, nursery sanitation, etc.	$30,005.02
2. For development of local control practices by testing and improving methods of control reconnaissance, the physical and chemical destruction of Ribes and determining the ecological factors effecting local control	27,263.34
3. For application of local control including control reconnaissance and eradication of Ribes on Federal lands.	38,585.00
4. For field studies and collection of field data on spread of rust, damage to pine, etc.	7,456.67
5. For scientific investigation of the behavior of the rust under western conditions.	12,000.00
9. For miscellaneous expenses, including supervision, supplies, clerical assistance, reserve, etc.	24,689.97
Total	$140,000.00

Organization and Personnel

The western branch of the Office of Blister Rust Control, located at 618 Realty Bldg., Spokane, Washington, is organized as a branch of the Washington Office of Blister Rust Control, Bureau of Plant Industry. The classes of personnel employed and the several definite assignments are as follows:

1. Supervisory: S. N. Wyckoff, Pathologist, in charge of western branch office.

2. Project Leaders:

   a. Quarantine inspection: C. R. Stillinger, Associate Pathologist.

Allotment of Funds, Fiscal Year 1926.

Project	Period July 1, 1925 to June 30, 1926
1. For application of general control measures to delay the spread of the rust including location and eradication of cultivated black currants, blister rust quarantine inspection work, nursery sanitation, etc.	$20,004.02
2. For development of local control practices by testing and improving methods of control reconnaissance, the physical and chemical destruction of Ribes and determining the ecological factors effecting local control	27,303.34
3. For application of local control including control reconnaissance and eradication of Ribes on Federal lands.	[illegible]
4. For field studies and collection of field data on spread of rust, damage to pine, etc.	7,456.67
5. For scientific investigation of the behavior of the rust under western conditions.	12,000.00
6. For miscellaneous expenses, including supervision, supplies, clerical assistance, reserve, etc.	[illegible]
Total	$140,000.00

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1. Supervisory: S. N. Wyckoff, Pathologist, in charge of western branch offices.

2. Project leaders:

a. Quarantine inspection: C. R. Stillinger, Associate Pathologist.

b. Local Control: W. A. Rockie, Assistant Pathologist, in charge of Field Unit #1,
C. C. Strong, Junior Forester, in charge of Field Unit #2.
c. Reconnaissance: H. N. Putnam, Assistant Pathologist.
d. Methods Study: J. L. Bedwell, Assistant Pathologist.
e. Ecological Study: T. Large, Field Assistant.
f. Chemical Eradication Study: H. R. Offord, Field Assistant.
g. Educational Work: C. R. Stillinger, Associate Pathologist.

3. State Leaders:

Montana: C. H. Johnson, Assistant Pathologist.
Idaho: H. Schmitz, Agent.
Oregon: L. N. Goodding, Assistant Pathologist, with P. E. Melis, Junior Forester, in field charge of experimental local control.
California: G. A. Root, Assistant Pathologist.

4. Clerical work: R. Calhoun, Principal Clerk and Temporary Special Disbursing Agent; Mrs. L. Klatt, Assistant Clerk-Stenographer.

Report of Work for the Year.

In all previous annuals reports of the western office, the account of work done has been presented according to the projects as given in the allotment of funds. Due to the fact that such projects as Ribes eradication and reconnaissance are now being carried on in several states, it is considered better to organize the subject matter of this report as a series of state reports. Each state report will consist of a general statement of the organization and activities in that state, the cooperative agreement under which the work was done, and the individual reports of the state and project leaders.

BLISTER RUST CONTROL WORK IN MONTANA, 1925.

Blister rust control work in Montana is conducted under the immediate supervision of Mr. C. H. Johnson, Assistant Pathologist. Through the cooperation of the Montana State Department of Agriculture, Mr. Johnson is given office space in the office of the Chief of the Division of Horticulture of that Department, Chamber of Commerce Bldg., Missoula, Montana. The following is the memorandum of understanding, under the terms of which the work in Montana is organized:

b. Local Control: W. A. Rockie, Assistant Pathologist, in charge of Field Unit #1.
   C. C. Strong, Junior Forester, in charge of Field Unit #2.
c. Reconnaissance: H. N. Putnam, Assistant Pathologist.
d. [illegible] Study: [illegible], Assistant Pathologist.
e. Ecological Study: T. Large, Field Assistant.
f. Chemical Eradication Study: [illegible], Field Assistant.
g. Miscellaneous Notes: [illegible], Associate Pathologist.

3. State Leaders:

Montana: C. R. Johnson, Assistant Pathologist.
Idaho: [illegible].
Oregon: L. N. Goodding, Assistant Pathologist, with F. L. Mells, Junior Forester, in field charge of experimental local control.
California: [illegible], Assistant Pathologist.

4. Clerical work: R. Calhoun, Principal Clerk and Temporary [illegible]; [illegible], Assistant Clerk-Stenographer.

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MEMORANDUM OF UNDERSTANDING BETWEEN THE MONTANA STATE DEPARTMENT OF AGRICULTURE, THE MONTANA STATE FOREST DEPARTMENT AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN MONTANA.

EFFECTIVE JULY 1, 1925 to JUNE 30, 1926.

The object of this memorandum of understanding shall be to facilitate the prompt location and eradication and effective control of white pine blister rust in Montana, in view of the threatened destruction of timber throughout the West, as a result of the presence of this menace in the West, and the danger of its further spread by natural dissemination or quarantine violation.

It is agreed that the Montana State Department of Agriculture and the Montana State Forest Department, parties of the first part, and the Bureau of Plant Industry, United States Department of Agriculture, party of the second part, shall cooperate to the above ends in accordance with the following plans:

1. The Bureau of Plant Industry shall pay the salaries and expenses of one or more men who shall perform the necessary scouting for the disease in Montana. The Montana State Department of Agriculture shall deputize these scouts to enable them to enter and inspect any property but not to destroy plants.

2. In view of the fact that the Montana State Department of Agriculture has no special appropriation for blister rust control, it is understood that when this rust appears in Montana, the Montana State Department of Agriculture agrees to immediately make every effort to secure funds for its eradication from sources available to it, and in the event of failure to secure necessary funds for this purpose, the Montana State Department of Agriculture shall deputize the employees of the Bureau of Plant Industry working in Montana, empowering them to destroy blister rust host plants infected or potentially infected with this disease.

3. The Montana State Department of Agriculture and the Bureau of Plant Industry shall cooperate with the Federal Horticultural Board in inspection for the purpose of aiding in the enforcement of State or Federal blister rust quarantines now in effect or which may be promulgated. The Bureau of

Plant Industry shall pay the salaries and expenses and direct the work of one or more men who shall during the proper season inspect for violations of the Federal blister rust quarantines. These men shall also cooperate with the Montana State Department of Agriculture in enforcing state quarantines. For this purpose they shall receive instructions in methods of procedure from the Montana State Department of Agriculture and shall be deputized to destroy plants shipped in violation of State quarantines.

4. The Montana State Department of Agriculture and its cooperators shall use their regular employees, so far as their other duties permit, in systematically locating cultivated black currants and infected or potentially infected blister rust host plants; in scouting for the blister rust; in inspecting nurseries for this disease and in enforcing State and Federal blister rust quarantines. Such work will represent a total expenditure on the part of the Montana State Department of Agriculture and its cooperators of about $5000.00 for control of this disease. The expenditures of the Bureau of Plant Industry indicated in previous paragraphs will aggregate approximately $5000.00 but none of the Federal funds shall be spent in compensation for plants destroyed in control work.

5. The Montana State Forest Department shall use its regular employees as far as their duties permit, in systematically locating and in scouting for the blister rust and taking such action as is deemed necessary in preventing the spread of the blister rust in territory under their control and supervision. Such work will aggregate a total expenditure by the Montana State Forest Department of approximately $1000.00 for the control of this menace during the period covered by this agreement.

6. All official records of the work performed under this agreement shall be open to inspection by any or all parties to this agreement. All findings of the blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement. All specimens collected by any party to this agreement, which are suspected to be infected with blister rust, shall be submitted to the Bureau of Plant Industry for final determination. The Bureau of Plant Industry shall give such technical information to the employees of the parties to this agreement as will enable them to recognize the several stages of this disease.

7. It is understood that the Bureau of Plant Industry shall be primarily responsible for scouting and locating the blister rust in Montana, and for furnishing technical information on its control, but that the Federal Government has no authority to

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6. All official records of the work performed under this agreement shall be open to inspection by any or all parties to this agreement. All findings of the blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement. All specimens collected by any party to this agreement, which are suspected to be infected with blister rust, shall be submitted to the Bureau of Plant Industry for final determination. The Bureau of Plant Industry shall give such technical information to the employees of the parties to this agreement as will enable them to recognize the several stages of this disease.

7. It is understood that the Bureau of Plant Industry shall be primarily responsible for scouting and locating the blister rust in Montana, and for furnishing technical information on its control, but that the Federal Government has no authority to

destroy private or State property and therefore that the Montana State Department of Agriculture shall be wholly responsible for destroying such pines, currant and gooseberry plants as may be found necessary in order to control the spread of this disease in Montana including plants shipped in violation of State and Federal blister rust quarantines.

8. This memorandum of understanding shall take effect July 1, 1925 and continue in force until June 30, 1926, or until previously terminated by mutual consent of the parties to this agreement.

Date	Signature
	(s.) A. H. Bowman Commissioner of Agriculture, Montana State Department of Agriculture,
	(s.) R. P. McLaughlin State Forester, State Forest Department.
	(s.) Wm. A. Taylor Chief, Bureau of Plant Industry.

Blister Rust Work in Montana
1925

C. H. Johnson, Assistant Pathologist.

Eradication of cultivated black currants was resumed in Montana on May 18th when two men with one automobile commenced work. On July 1st another man and machine was added and operations continued until September 16th when the territory outlined for the season, comprising 20 counties was completed. Since the eradication program was inaugurated three years ago work has been conducted in 38 counties. Approximately two-thirds of the state has been completed.

The number of black currant plantings found the past season shows an appreciable falling off, which can partly be accounted for by the fact that in almost one-half of the counties covered, dry farming with its one crop system has been pursued. The results, through the failure of the single crop, have proven so disastrous that no thought, it seems, has ever been entertained of growing trees, shrubs or small fruits.

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Commissioner of Agriculture, Montana State Department of Agriculture.

(s.) [illegible]
State Forester, State Forest Department.

(s.) Wm. A. Taylor
Chief, Bureau of Plant Industry.

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[illegible] Johnson, Assistant Pathologist.

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From a preliminary survey it was pretty definitely known whether a county would be rich in its yield of black currants. Some time was spent in each county studying conditions and consulting county agents who were able to give information regarding location of irrigated and most productive areas. Such information formed only a basis of work for the county. In each county every town was worked regardless of whether prospects were poor or good for finding black currants, but previous information obtained and our knowledge of conditions made it possible to eliminate large areas of open prairie wheat and grazing land thereby facilitating more rapid progress.

The accompanying table shows the results of this work by counties:

County	Eradicated		Not Eradicated		Total	
	Plantings	Plants	Plantings	Plants	Plantings	Plants
Cascade	42	212	1	7	43	219
Fergus	7	34	0	0	7	34
Hill	1	4	0	0	1	4
Liberty	0	0	0	0	0	0
Blaine	0	0	0	0	0	0
Toole	0	0	0	0	0	0
Yellowstone	14	74	2	18	16	92
Stillwater	2	5	0	0	2	5
Carbon	2	7	0	0	2	7
Musselshell	1	2	0	0	1	2
Park	6	36	0	0	6	36
Meagher	1	4	0	0	1	4
Broadwater	0	0	0	0	0	0
Gallatin	11	46	0	0	11	46
Golden Valley	0	0	0	0	0	0
Wheatland	0	0	0	0	0	0
Sweetgrass	0	0	0	0	0	0
Judith Basin	0	0	0	0	0	0
Chauteau	0	0	0	0	0	0
Big Horn	0	0	0	0	0	0
Totals	87	424	3	25	90	449

On the 6th day of August a proclamation was issued by the Governor of Montana placing a quarantine against the cultivated black currant and ordering their destruction within the state. Good progress has been made since the proclamation was issued.

A number of the growers in possession of the larger plantings objected strenuously towards any action tending to relieve them of their bushes, however, an agreement was reached whereby those opposing eradication have consented to remove their bushes over a period of five years, thus making the loss less noticeable and further enabling them to gradually replace the black currants with some other species.

There was left over from 1923-1924 location work a total of 824 bushes in 18 counties which could not be removed because no legal authority existed for their removal. Of this number 613 bushes were located in Missoula and Ravalli counties. Since the proclamation was issued and special agreement reached with growers, 288 of the 613 bushes in Missoula and Ravalli counties have been removed, 246 bushes will be removed by owners over a period of five years and five growers of 79 bushes have not yet been consulted. Using these figures as a basis for comparison there is every reason to believe that equally good results can be obtained in securing the eradication of the 211 bushes scattered throughout 16 counties.

The cooperative agreement existing between the Montana State Department of Agriculture and the Bureau of Plant Industry was further strengthened by an increase in the amount from $500.00 to $6,000.00 for control of the blister rust when it reaches the state.

An active interest was shown by the Inspectors of the Department of Agriculture in blister rust. County Agents were made familiar with the disease and express their willingness to aid in whatever manner possible to secure the destruction of black currants in their respective counties. In a number of instances black currant locations were made with the help of the County Agents.

The Montana State Forestry Department has given its support to whatever measures may be necessary to prevent the spread of the blister rust in Montana. During the summer contact was established with the field forces of the State Forestry service and Northern Montana Protective Association. Sufficient time was spent with rangers and patrolmen explaining blister rust, methods of control and helping to identify the various host plants.

The two reel blister rust film, "A Menace to Western Timber" was presented to the public wherever it was possible. At Great Falls, the third largest town in Montana, this film as far as I have knowledge, was subjected to the first criticism. The manager of the Liberty, one of the leading theaters in the state, remarked that the photography was a disgrace to the film and about the worst he had ever presented to his audience. He was commended for his frankness and made to feel that good constructive criticism was always appreciated. In spite of such adverse comments the film was presented before the largest crowd that is recorded for any town in the state.

The following figures give the attendance for the towns in which the blister rust film has been shown:

Town	Attendance
Great Falls	5,000
Lewistown	800
Billings	4,000
Livingston	400
Bozeman	1,200
Total	11,400

Blister rust exhibits were put on at the State Fair at Helena and the Western Montana Fair at Missoula. The weather was ideal and both fairs were considered the most successful in years. Many people learned about the blister rust for the first time.

Scouting for blister rust was conducted in the principal white pine areas of northwestern Montana. Following is a tabulation giving the total number of Ribes of the various species inspected in the different localities:

Locality	Number bushes various species inspected.
Blackfoot and Missoula rivers and tributaries	1230 R. petiolare
	129 R. lacustre
	312 G. setosa
	75 R. nigrum
	Total 1746
Bitter Root and West Fork of Bitter Root rivers	1635 R. petiolare
	336 R. lacustre
	126 G. setosa
	180 R. nigrum
	Total 2277
South Fork and North Forks of Flathead river	135 R. petiolare
	48 R. lacustre
	67 G. setosa
	36 G. inermis
	25 R. nigrum
	Total 311
Stillwater river	48 R. petiolare
	126 G. setosa
	63 R. lacustre
	Total 237
Thompson and Clarks Fork Rivers	228 R. americanum
	63 R. lacustre
	24 G. setosa
	42 R. petiolare
	Total 357
Grand Total	4928

BY THE GOVERNOR OF THE STATE OF MONTANA -- A PROCLAMATION.

* * * *

Whereas, the fact has been determined that the dangerous and injurious disease known as the white pine blister rust (Peridermium strobi Kleb) now exists in the western part of the State of Washington and in the Province of British Columbia; and

Whereas, there is danger that this disease may be introduced into the valuable forests of western white pine (Pinus monticola) in Montana; and

Whereas, it has been further determined that the cultivated black currant (Ribes nigrum) and its varieties are the most dangerous alternate host plants of this disease, and that the occurrence of the plant in the State of Montana constitutes a direct menace to the white pine forests;

NOW, THEREFORE, I, J. E. Erickson, Governor of the State of Montana by virtue of the authority vested in me by Chapter 61 of the Session Laws of the Thirteenth Legislative Assembly, do hereby proclaim the cultivated black currant (Ribes nigrum) and its varieties to be a public nuisance in the State of Montana. The destruction of these plants is hereby ordered in this State, and it shall be unlawful for any person to possess, propagate, sell or offer for sale these plants in the State of Montana.

In addition, I do hereby declare and proclaim a quarantine prohibiting the shipment or movement of any cultivated black currant plants (Ribes nigrum and its varieties) into or within the State of Montana.

All horticultural inspectors are hereby ordered and instructed to intercept, condemn, destroy or return to the shipper any movement or shipment of cultivated black currants into or within the State of Montana, and to condemn and destroy any black currants found growing in the State of Montana. Any violation of these orders will be dealt with according to law.

This order shall take effect and be in force on and after the sixth day of August, 1925.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal to be affixed.
Done at the City of Helena, the Capital this the sixth day of August in the year of our Lord one thousand nine hundred twenty-five.

J. E. Erickson,
Governor.

BY THE GOVERNOR OF THE STATE OF MONTANA -- A PROCLAMATION.

* * *

Whereas, the fact has been determined that the dangerous and injurious disease known as the white pine blister rust (Peridermium strobi Kleb) now exists in the western part of the State of Washington and in the Province of British Columbia; and

Whereas, there is danger that this disease may be introduced into the valuable forests of western white pine (Pinus monticola) in Montana; and

Whereas, it has been further determined that the cultivated black currant (Ribes nigrum) and its varieties are the most dangerous alternate host plants of this disease, and that the occurrence of the plant in the State of Montana constitutes a direct menace to the white pine forests;

NOW, THEREFORE, I, J. E. Erickson, Governor of the State of Montana by virtue of the authority vested in me by Chapter [illegible] of the Session Laws of the Thirteenth Legislative Assembly, do hereby proclaim the cultivated black currant (Ribes nigrum) and its varieties to be a public nuisance in the State of Montana. The destruction of these plants is hereby ordered in this State, and it shall be unlawful for any person to possess, transport, sell or offer for sale these plants in the State of Montana.

In addition, I do hereby declare and proclaim a quarantine prohibiting the shipment or movement of any cultivated black currant plants (Ribes nigrum and its varieties) into or within the State of Montana.

All horticultural inspectors are hereby ordered and instructed to intercept, condemn, destroy or return to the shipper any movement or shipment of cultivated black currants into or within the State of Montana, and to condemn and destroy any black currants found growing in the State of Montana. Any violation of these orders will be dealt with according to law.

This order shall take effect and be in force on and after the sixth day of August, 1925.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal to be affixed.
Done at the City of Helena, the Capital this the sixth day of August in the year of our Lord one thousand nine hundred twenty-five.

J. E. Erickson,
Governor.

BLISTER RUST CONTROL WORK IN IDAHO, 1925.

Blister rust control work in Idaho during 1925 has been partly under the direct supervision of the Spokane office, and partly directed by Professor H. Schmitz, Agent, Forestry School, University of Idaho, Moscow, Idaho, acting as State Leader. Prior to Professor Schmitz's resignation from the faculty of the University, he directed all cultivated black currant eradication and educational work within the state. The several experimental projects leading to the development of local control practices were directly supervised by the Spokane Office.

The following is the memorandum of understanding, under the terms of which the work in Idaho is organized:

MEMORANDUM OF UNDERSTANDING BETWEEN THE IDAHO STATE DEPARTMENT OF AGRICULTURE, THE UNIVERSITY OF IDAHO, THE STATE BOARD OF FORESTRY, THE POTLATCH TIMBER PROTECTIVE ASSOCIATION, THE CLEARWATER TIMBER PROTECTIVE ASSOCIATION, THE COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION, THE PEND OREILLE TIMBER PROTECTIVE ASSOCIATION, THE PRIEST LAKE TIMBER PROTECTIVE ASSOCIATION AND THE BUREAU OF PLANT INDUSTRY OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN IDAHO.

EFFECTIVE JULY 1, 1925 to JUNE 30, 1926.

The object of this memorandum of understanding shall be to facilitate the prompt location and eradication and effective control of white pine blister rust in Idaho, in view of the threatened destruction of private, state and nationally owned timber throughout the west, as a result of the presence of this disease in British Columbia and Washington, and the danger of its further spread by natural dissemination or quarantine violations.

It is agreed that the Idaho State Department of Agriculture, the University of Idaho, the State Board of Forestry, the Potlatch Timber Protective Association, the Clearwater Timber Protective Association, the Coeur d'Alene Timber Protective Association, the Pend Oreille Timber Protective Association, the Priest Lake Timber Protective Association, parties of the first part, and the Bureau of Plant Industry, United States Department of Agriculture, party of the second part, shall cooperate to the above ends in accordance with the following plan:

1. The Idaho State Department of Agriculture and the Bureau of Plant Industry, U. S. Department of Agriculture shall cooperate with the Federal Horticultural Board in inspection for the purpose of aiding in the enforcement of state and federal blister rust quarantines now

in effect or which may be promulgated; in scouting for blister rust and locating infected or potentially infected host plants; inspection of nurseries; and the location and eradication of the cultivated black currant in Idaho. The above work and cooperation will aggregate a total expenditure by the Idaho State Department of Agriculture of approximately $2000.00 for the period covered by this agreement. The expenditures by the Bureau of Plant Industry, U. S. Department of Agriculture, indicated in this paragraph will aggregate about $4800.

2. The Idaho State Board of Forestry shall cooperate through its deputized agents, in so far as their other duties will permit, in systematically locating cultivated black currants, scouting for blister rust and locating infected or potentially infected host plants. It shall also cooperate directly in so far as it is able and as the necessity arises in promoting and assisting in the various blister rust control activities carried on in the state.

3. The School of Forestry, University of Idaho and the Bureau of Plant Industry, U. S. Department of Agriculture agree to cooperate as follows: The School of Forestry, University of Idaho, agrees to detail one member of its staff to cooperative white pine blister rust control work throughout the field season and to allow him sufficient time during the remainder of the year to generally supervise such work in Idaho. Furthermore the School of Forestry, University of Idaho, agrees to continue a study on the rate of growth of western white pine remaining on areas after logging and a study to determine expected yields of second growth white pine stands. Such cooperation and work will aggregate an expenditure of approximately $4300 by the School of Forestry, University of Idaho, and approximately $825 by the Bureau of Plant Industry, U. S. Department of Agriculture.

4. The Department of Plant Pathology of the University of Idaho Agricultural Experiment Station agrees to examine all specimens suspected of being infected with the white pine blister rust when sent in by the field scouts and others, and to keep the necessary records of such collections. It is also agreed that all specimens which are suspected of being infected with the blister rust shall be submitted to the U. S. Bureau of Plant Industry for final determination. ~~Such work will aggregate a total expenditure on the part of the Department of Plant Pathology of the University of Idaho Agricultural Experiment Station of approximately $______ for the control of this disease for the period covered by this agreement.~~

5. The Extension Division of the University of Idaho College of Agriculture shall use its regular employees, in so far as their other duties may permit, in locating cultivated black currants and other infected or potentially infected blister rust host plants, and in giving publicity to the campaign to eradicate black currants and to other means for preventing the introduction and spread of white pine blister rust in Idaho. ~~Such work will aggregate a total expenditure on the part of the Extension Division of the University of Idaho~~

in effect or which may be promulgated; in scouting for blister rust and locating infected or potentially infected host plants; inspection of nurseries; and the location and eradication of the cultivated black currant in Idaho. The above work and cooperation will aggregate a total expenditure by the Idaho State Department of Agriculture of approximately $[illegible] for the period covered by this agreement. The expenditures by the Bureau of Plant Industry, U. S. Department of Agriculture, indicated in this paragraph will aggregate about $[illegible].

2. The Idaho State Board of Forestry shall cooperate through its deputized agents, in so far as their other duties will permit, in systematically locating cultivated black currants, scouting for blister rust and locating infected or potentially infected host plants. It shall also cooperate directly in so far as it is able and as the necessity arises in promoting and assisting in the various blister rust control activities carried on in the state.

3. The School of Forestry, University of Idaho and the Bureau of Plant Industry, U. S. Department of Agriculture agree to cooperate as follows: The School of Forestry, University of Idaho, agrees to detail one member of its staff to cooperative white pine blister rust control work throughout the field season and to allow him sufficient time during the remainder of the year to generally supervise such work in Idaho. Furthermore the School of Forestry, University of Idaho, agrees to continue a study on the rate of growth of western white pine reproduction on areas after logging and a study to determine expected yields of second growth white pine stands. This cooperation and work will aggregate an expenditure of approximately $[illegible] by the School of Forestry, University of Idaho, and approximately $[illegible] by the Bureau of Plant Industry, U. S. Department of Agriculture.

4. The Department of Plant Pathology of the University of Idaho Agricultural Experiment Station agrees to examine all specimens suspected of being infected with the white pine blister rust when sent in by the field scouts and others, and to keep the necessary records of such collections. It is also agreed that all specimens which are suspected of being infected with the blister rust shall be submitted to the U. S. Bureau of Plant Industry for final determination. ~~Such work will aggregate a total expenditure on the part of the Department of Plant Pathology of the University of Idaho Agricultural Experiment Station of approximately $______ exclusive of ________ for the period covered by this agreement.~~

5. The Extension Division of the University of Idaho College of Agriculture shall use its regular employees, in so far as their other duties may permit, in locating cultivated black currants and other infected or potentially infected blister rust host plants, and in giving publicity to the campaign to eradicate black currants and to other means for preventing the introduction and spread of white pine blister rust in Idaho. ~~Such work will aggregate a total expenditure on the part of the Extension Division of the University of Idaho~~

~~College of Agriculture of approximately $ _______ for the control of this disease for the period covered by this agreement.~~

6. The Potlatch Timber Protective Association, the Clearwater Timber Protective Association, the Coeur d'Alene Timber Protective Association, the Pend Oreille Timber Protective Association, and the Priest Lake Timber Protective Association shall cooperate by contributing the services of their employees, in so far as their other duties will permit, to assist in systematically locating cultivated black currants, scouting for the rust within the boundaries of their respective associations, and in general investigations to secure complete information concerning the age and amount of white pine second growth on logged-off and burned-over lands within the boundaries of their respective associations; and to determine by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands, as a basis of determining the cost and feasibility of local control of blister rust on these lands. Such cooperation will aggregate a total expenditure of approximately $3100.00 on the part of the Potlatch Timber Protective Association, $ 3350.00 on the part of the Clearwater Timber Protective Association, $ 3300.00 on the part of the Coeur d'Alene Timber Protective Association, $3400.00 on the part of the Pend Oreille Timber Protective Association, $3680.00 on the part of the Priest Lake Timber Protective Association, for the period covered by this agreement. The expenditure by the Bureau of Plant Industry, U. S. Department of Agriculture, as indicated in this paragraph, shall aggregate a total expenditure of approximately $6700.

7. All official records and reports of the work performed under this agreement shall be open to inspection by any or all parties to this agreement.

8. All findings of the blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement.

9. All specimens collected by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Department of Plant Pathology, University of Idaho which will in turn forward them to the U. S. Bureau of Plant Industry for final determination.

10. The U. S. Bureau of Plant Industry shall give such technical information to the employees of the parties to this agreement as will enable them to recognize the several stages of this disease.

11. All expenditures made by the Bureau of Plant Industry, U. S. Department of Agriculture shall be made in accordance with the fiscal regulations of the U. S. Department of Agriculture.

[illegible] of appropriations [illegible] for the control of blister rust for the period covered in this agreement.

6. The Potlatch Timber Protective Association, the Clearwater Timber Protective Association, the Coeur d'Alene Timber Protective Association, the Pend Oreille Timber Protective Association, and the Priest Lake Timber Protective Association shall cooperate by contributing the services of their employees, in so far as their other duties will permit, to assist in systematically locating cultivated black currants, scouting for the rust within the boundaries of their respective associations, and in general investigations to secure complete information concerning the age and amount of white pine second growth on logged-off and burned-over lands within the boundaries of their respective associations; and to determine by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands, as a basis of determining the cost and feasibility of local control of blister rust on these lands. Such cooperation will aggregate a total expenditure of approximately $2100.00 on the part of the Potlatch Timber Protective Association, $ 2250.00 on the part of the Clearwater Timber Protective Association, $ 2300.00 on the part of the Coeur d'Alene Timber Protective Association, $2400.00 on the part of the Pend Oreille Timber Protective Association, $[illegible] on the part of the Priest Lake Timber Protective Association, for the period covered by this agreement. The expenditure by the Bureau of Plant Industry, U. S. Department of Agriculture, as indicated in this paragraph, shall aggregate a total expenditure of approximately $6700.

7. All official records and reports of the work performed under this agreement shall be open to inspection by any or all parties to this agreement.

8. All findings of the blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement.

9. All specimens collected by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Department of Plant Pathology, University of Idaho which will in turn forward them to the U. S. Bureau of Plant Industry for final determination.

10. The U. S. Bureau of Plant Industry shall give such technical information to the employees of the parties to this agreement as will enable them to recognize the several stages of this disease.

11. All expenditures made by the Bureau of Plant Industry, U. S. Department of Agriculture shall be made in accordance with the fiscal regulations of the U. S. Department of Agriculture.

12. This memorandum of understanding between each of the parties of the first part and the party of the second part shall take effect July 1, 1925 and continue in force until June 30, 1926. This memorandum of understanding may be terminated between any one of the parties of the first part and the party of the second part at any time previous to said date by mutual consent of the said parties, but such action shall not abrogate the understanding between the party of the second part and the other members of the party of the first part.

Date	Signature	Estimated value of Cooperative Work
Sept. 29, 1925	(s.) A. W. B. Kjosness Commissioner, Idaho Department of Agriculture.	$2,000.00
Nov. 24, 1925	(s.) Ben E. Bush State Forester.	
Oct. 16, 1925	(s.) F. G. Miller Dean, School of Forestry, University of Idaho.	$4,300.00
Oct. 17, 1925	(s.) Chas. W. Hungerford Pathologist, Agricultural Experiment Station, University of Idaho.	
	(s.) E. J. Iddings Director, Agricultural Experiment Station and Director of Extension, University of Idaho.	
Nov. 24, 1925	(s.) A. W. Laird President, Potlatch Timber Protective Association.	$3100.00
Dec. 2, 1925	(s.) A. A. Rubudew President, Clearwater Timber Protective Association.	$3350.00
Dec. 7, 1925	(s.) Huntington Taylor President, Coeur d'Alene Timber Protective Association.	$3800.00
Dec. 16, 1925	(s.) B. H. Hornby President, Pend Oreille Timber Protective Association.	$3400.00
Nov. 24, 1925	(s.) Ben E. Bush President, Priest Lake Timber Protective Association.	$3680.00
	(s.) Wm. A. Taylor Chief, Bureau of Plant Industry U. S. Department of Agriculture.	$12,325.00

15. This memorandum of understanding between each of the parties of the first part and the party of the second part shall take effect July 1, 1925 and continue in force until June 30, 1926. This memorandum of understanding may be terminated between any one of the parties of the first part and the party of the second part at any time previous to said date by mutual consent of the said parties, but such action shall not abrogate the understanding between the party of the second part and the other members of the party of the first part.

Date	Signature	Estimated value of Cooperative Work
[illegible], 1925	(s.) [illegible] Commissioner, Idaho Department of Agriculture.	[illegible]
[illegible], 1925	(s.) [illegible] State Forester.	
Oct. [illegible], 1925	(s.) [illegible] Miller Dean, School of Forestry, University of Idaho.	$4,300.00
Oct. 17, 1925	(s.) Chas. W. Hungerford Pathologist, Agricultural Experiment Station, University of Idaho.	
	(s.) E. J. Iddings Director, Agricultural Experiment Station and Director of Extension, University of Idaho.	
[illegible], 1925	(s.) [illegible] Laird President, Potlatch Timber Protective Association.	$2100.00
Dec. [illegible], 1925	(s.) A. A. [illegible] President, Clearwater Timber Protective Association.	$3550.00
Dec. 7, 1925	(s.) Huntington Taylor President, Coeur d'Alene Timber Protective Association.	$3800.00
Dec. 15, 1925	(s.) [illegible] President, Pend Oreille Timber Protective Association.	$2400.00
Nov. 24, 1925	(s.) [illegible] President, Priest Lake Timber Protective Association.	$3680.00
	(s.) Wm. A. Taylor Chief, Bureau of Plant Industry U. S. Department of Agriculture.	$12,325.00

Report on
Black Currant Eradication, Idaho
Summer 1925
by

C. R. Stillinger, Associate Pathologist.

In accordance with the black currant campaign that has been carried out as a part of the fight against white pine blister rust, the eradication of cultivated black currants was continued in Idaho during this last summer. This was the third season for this work in Idaho. Up until this season all of the cultivated black currants had been eradicated in northern Idaho and some in southern Idaho. During this last season the work has centered chiefly in those southern counties bordering the Snake River, this leaving primarily only the counties in the southeastern corner of Idaho unfinished.

The work has been carried out under the cooperative agreement which this Office has with the state blister rust agencies of Idaho. The 18th State Legislature of Idaho appropriated $4,000 for the biennium 1925 and 1926. One half of this sum plus an equal amount of Federal money has been expended during this last season on the work.

The work has been carried on in the field by three two man crews with one car to each crew. The work during the early part of the season was under the direction of Dr. Henry Schmitz, Forestry School, University of Idaho. Upon his departure the work was supervised by the Office of Blister Rust Control, Spokane, Washington.

The following table is a summary of the work for the summer:

County	No. Plantings Eradicated	No. Plants Eradicated
Cassia	103	733
Minidoka	80	414
Twin Falls	129	487
Gooding	4	27
Jerome	49	360
Lincoln	4	30
Blaine	15	71
Camas	0	0
Elmore	3	9
Ada	12	85
Owyhee ½	0	0
Canyon ½	5	38
Total	404	2254

During previous seasons 602 plantings comprising 3899 plants had been eradicated. This seasons totals makes the number which have been eradicated in Idaho to date 1006 plantings comprising 6153 plants.

There still remains to be done the following counties in southern Idaho: Payette, Jefferson, Madison, Teton, Bonneville, Bingham, Power, Bannock, Caribou, Bear Lake, Franklin, Oneida, Owyhee (half) and Canyon (half).

Scouting for the Disease

In September, 1925, two trained men were put into the field to scout for the disease in northern Idaho. These men worked separately for part of the time, and together, from an auto, for the remainder. Instructions to these men were similar to those issued to the eastern Washington scouts. Special search was made for plants of Ribes nigrum which might have been missed by the eradication crews, both to locate the bushes and secure their eradication, and to seek the most favorable blister rust hosts, but none were found. No evidences of the rust were discovered in the course of this work. The following tabulation gives the results of the scouting work done:

Scouting for the Disease, Northern Idaho,
September, 1925.

Locality	Ribes Inspected						Total
	Native Species			Cultivated Species			
	R. lacustre	R. visco.	G. inermis	R. vulgare	R. odoratum	G. reclinata	
Priest River - Coolin Road	15		2				17
Coolin - east of town		8					8
Coolin - west of town	8						8
Coolin - outlet trail		4					4
North Fk. of East River	11		45				56
Coolin - town				11		2	13
Melcher road	60		42				102
Coolin to Soldier Creek		75					75
Big Creek	10		5				15
Coolin - 10 miles south	5		1				6
Coolin - 20 miles south	10	1	9				20
Sandpoint	5		10				15
Bonners Ferry				15	1		16
Porthill			2			7	9
Porthill - 4 miles south			10				10
Bonners Ferry - 25 miles north			10				10
Moyie River - just below Eastport	4		1				5
Eastport - 2 miles south			2				2
Eastport - 7 miles south			4				4
Bonners Ferry-4miles down river			24				24
Bonners Ferry 5miles down river			45				45
Bonners Ferry-7miles down river			4				4
Porthill-Summit Lake road		14					14
Porthill-Summit 1 mile south	15						15
Porthill-2 miles south	12						12
Porthill-3 miles south	17	1					18
Porthill-4 miles south	15						15
Porthill-5 miles south	20						20
Porthill-13 miles south	10	5					15
Bonners Ferry-5 miles east						10	10
Bonners Ferry - 20 miles east	25						25
Bonners Ferry - 29 miles east	20						20
Bonners Ferry - 3 miles south		5					5
Bonners Ferry - 8 miles south	35		15				50
Deep Creek road	25		10				35
Deep Creek road 3 miles on	15						15
Bonners Ferry 10 miles south			5				5
Total	337	113	246	26	1	19	742

Ribes Eradication on National Forests, Idaho

Stephen N. Wyckoff, Pathologist

The report of this office for the calendar year 1924 includes an account of Ribes eradication in the Upper Priest River Valley. The maps accompanying that report show the exact location of the areas completed in 1924. During the season of 1925 this work was again started at the point at which it was left off in 1924, and continued in a southerly direction down the valley.

The purpose of this work was to apply the best known methods of Ribes eradication on a scale sufficiently large to determine their feasibility, efficiency and cost. Working in close conjunction with this project a further experimental project was carried on to devise improvements in eradication methods or new methods.

Organization and Personnel

Ribes eradication was organized on the basis of two working units, of 4 crews each. The personnel of each unit was as follows:

- 1 Field Supervisor.
- 2 Scouts.
- 4 Foremen.
- 20-23 Laborers.
- 1 Cook
- 1 Flunkey.

One of the two scouts was designated as Camp Boss. His additional duties were to assist the Field Supervisor in direction of the work, to take charge of the camp in his absence, and supervise work of side camps.

N.V.B. ~~~~

The two Field Supervisors were a part of the permanent personnel of this office. Mr. W. A. Rockie was Field Supervisor for Unit #1, and Mr. C. C. Strong for Unit #2. The two Camp Bosses were temporary men, one of whom was a candidate for permanent appointment. All other men were temporary. Laborers and foremen were employed under letter of authorization, while scouts were under temporary appointment.

The following will give the wage scales for the two units:

	Unit #1	Unit #2
Field Supervisor	$225.00 per mo.	$155.00 per mo.
Camp Boss	125.00 " "	125.00 " "
Scout	100.00 " "	3.30 per day.

	Unit #1	Unit #2
Foremen	$3.10-$3.30 per day	$3.10-$3.35 per day
Laborers	$2.70-$2.90 per day	$2.70-$2.90 per day
Cook	$125.00 per mo.	$125.00 per mo.
Flunkey	$50.00 per mo.	$60.00-$70.00 per mo.

Camp bosses were chosen for experience in blister rust work, woodsmanship, general intelligence and directive ability. In general men who have had several seasons of blister rust or forestry experience, have shown the requisite ability and are candidates for permanent appointment are chosen for this work, since it affords an admirable opportunity to judge of their qualifications as future project leaders.

Scouts are chosen for similar qualifications in experience, woodsmanship and intelligence. In general, they will constitute the class from which additional camp bosses will be chosen next year.

Foremen are chosen for experience in Ribes eradication and directive ability. They are considered as potential material for next season's scouts.

It has been the policy of this office to secure laborers (crew men) from the lower forestry classes of the western universities. As a rule they represent a hard working, self reliant type, generally accustomed to woods work. If possible they are chosen from the lower classes in college, to insure trained laborers and potential foreman material the following year.

Each Field Supervisor was directly responsible to the Spokane office, the two units thus operating independently of each other, except for use of the common service of supply.

Transportation of Supplies and Equipment

Supplies and equipment were transported from Spokane to the camps as follows:

1. By truck, Spokane to Coolin, Idaho. Trucking performed by Forest Service. Rate, $.50 per hundredweight, in truckload lots.
2. By boat, Coolin to Blister Rust Warehouse, head Upper Priest Lake. Contract awarded to S. T. Byars, Coolin. Rate, $.35 per hundredweight.
3. By pack train, warehouse to camp. Contract awarded to S. T. Byars. Rate, $1.90 per hundredweight.

The warehouse man took charge of all supplies and equipment used by the eradication units or the ecology camp in the Upper Priest River Valley. All such supplies and equipment were charged to the warehouse man by the Spokane office; he, in turn, charged them to the several units as they were requisitioned and delivered by pack train.

	Unit #[illegible]	Unit #[illegible]
[illegible]	[illegible] per mo.	[illegible] per mo.
Laborers	[illegible] per mo.	[illegible] per mo.
Cook	$125.00 per mo.	$135.00 per mo.
Flunkey	$50.00 per mo.	$60.00-$70.00 per mo.

Camp bosses were chosen for experience in blister rust work, woodsmanship, general intelligence and directive ability. In general men who have had several seasons of blister rust or forestry experience, have shown the requisite ability and are candidates for permanent appointment are chosen for this work, since it affords an admirable opportunity to judge of their qualifications as [illegible].

Scouts are chosen for similar qualifications in experience, [illegible] and intelligence. In general, they [illegible] from which additional camp bosses will be chosen next year.

Foremen are chosen for experience in Ribes eradication and directive ability. [illegible] season's [illegible].

It has been the policy of this office to secure laborers (crew men) from the lower forestry classes of the western universities. As a rule they represent a hard working, self reliant type, generally accustomed to woods work. If possible they are chosen from the lower classes in college, to insure trained laborers and potential foreman material [illegible].

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Transportation of Supplies and Equipment

Supplies and equipment were transported from Spokane to the camps as follows:

1. By truck, Spokane to Coolin, Idaho. Trucking performed by Forest Service. Rate, $.50 per hundredweight, in truckload lots.
2. By boat, Coolin to [illegible]. Contract awarded to [illegible], Coolin. Rate, [illegible] per hundredweight.
3. By pack train, warehouse to camp. Contract awarded to [illegible] Byars. Rate, [illegible].

The warehouse man took charge of all supplies and equipment used by the eradication units or the ecology camp in the Upper Priest River Valley. All such supplies and equipment were charged to the warehouse man by the Spokane office; he, in turn, charged them to the several units as they were requisitioned and delivered by pack train.

Location and Description of Area Worked

Location: The area selected for the season's work was that in the Upper Priest River Valley, lying just south of the 1924 eradication area. There were various reasons for selecting this area. In the first place, and most important, it was a step in completion of the drainage already begun in 1924. Second, the reconnaissance work done in 1924 gave information upon which to base the 1925 work. Third, the eradication types, age classes, and timber types were similar to those worked in 1924 thus giving a basis for comparing results with those of 1924. Fourth, the working of this area lessened the chance of infection getting a foothold just south of the Canadian Boundary where the first infection is likely to occur. Finally, being in close proximity to the 1924 area made it possible to observe and study the efficiency of the 1924 work.

Description: The area worked in 1925 was one of very rough and rugged topography varying in elevation from 2600 feet to 6000 feet. Many streams form a network over the entire area thereby making for more difficult working conditions.

Due to the abundant moisture and the humid conditions prevailing in the region during most of the year there is a dense cover of timber and brush of many species and many ages.

Ribes were found to be densely distributed over most of the area and the average number per acre was about 86. It was found that the various other factors such as dense windfalls, thick reproduction, and abundance of brush combined with the factors mentioned to make very difficult working conditions. On the whole the area was much more difficult to work than the 1924 area.

Methods of Work

In general, the methods of Ribes eradication used were similar to those of the 1924 season. The standard 5-man crew with a foreman was used. During the course of the season, several improvements in methods were worked out. But because of the general disorganization of the work in the latter half of the season due to the serious forest fire situation, very little opportunity arose to put these new methods into effect. These methods are discussed in detail in the report on the methods study.

Designation and Use of Eradication Types

The eradication types designated in 1924 were again used, wit the addition of one other, now known as Type 2B, Open Mature Timber. This represents a stand of mature timber not sufficiently dense to shade

out the Ribes. Definitions of these types are as follows:

1. Stream type: a strip, along a stream varying in width, representing an opening in the timber stands, and bearing growth of shrubby vegetation, consisting usually of *Alnus*, *Salix*, *Acer*, *Rubus*, and Ribes. Average Ribes per acre, 150 to 800.

2. Ribes free type: Areas of dense overmature or mature timber stands in which Ribes, together with other such shrubby vegetation, have been mostly shaded out. Forest floor park-like in character, devoid of green vegetation, except in small isolated spots. Average Ribes per acre, 0 to 3.

2B. Open mature type: Mature stands of timber sufficiently open to support a ground cover of brush, which may contain an average of 50 to 600 Ribes per acre.

3. Brush or reproduction uniforms: an area in which brush or reproduction have a fairly uniform but sparse distribution. Average Ribes per acre, 25 to 200.

4. Brush or repro duction patchy: an area in which brush or reproduction occur in dense patches, separated by clearings, or in which clearings occur in a general brush or reproduction cover. Average Ribes per acre, 25 to 100.

5. Thicket: an area which is uniformly covered with a very dense stand of coniferous poles or reproduction, except where local irregularities in topography, rock outcrops, springs and seeps, etc., cause small brushy clearings, Average Ribes per acre, 5 to 60.

6. Age burn (___ year burn): an area recently burned, in whichthere is as yet no coniferous reproduction above the seedling stage, but dense brush and many Ribes. Average Ribes per acre, 500. Age of burn to be determined and designated by reconnaissance crews.

7. Rock Type: an area which is predominantly rock, either in the form of outcrop, slides, cliffs or ledges. These rocky patches may occur in any timber age class causing openings where very lettle vegetation exists. Many Ribes are found, particularly at the base of rock formations. Average Ribes per acre, 10 to 250.

It is now considered that a considerable part of the area designated as Type 2 in the 1924 report should have been segregated as Type 2B. True Type 2 is almost Ribes free, 4 plants per acre probably being a maximum. The average given in the 1924 report for Type 2 was 12.9 Ribes per acre. If Type 2B had then been recognized,and the area designated as Type 2 had been divided into Type 2 and Type 2B, the average Ribes per acre for Type 2 would have been much lower.

Results of Work

Tables 1 and 2, given below, show the results of the season's work for Units 1 and 2, respectively, and Table 3 gives the combined results of both camps.

Table No. 1.
Cost of Ribes Eradication by Types
Unit No. 1.

Type	Ribes per Acre R. lac.	R. vis.	Total	Acreage	Time Scout Days	Foreman Days	Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
1	211.7	2.1	213.8	25.5	2.00	4.75	23.75	$ 197.55	$7.75	$ .036
2	2.3	.5	2.8	380.5	4.25	1.58	7.90	92.10	.24	.036
2B	54.5	.4	54.9	263.0	4.00	15.00	75.00	606.79	2.31	.042
3	35.0	81.3	116.3	649.2	19.50	130.00	650.00	5147.22	7.93	.068
4	40.4	28.6	69.0	408.1	6.75	51.00	255.00	2012.67	4.93	.071
5	1.4	1.6	3.0	84.5	5.00	---	---	36.80	.43	.140
7	--	13.8	13.8	4.0	1.50	---	---	11.40	2.76	.200
	33.0	35.8	68.8	1814.0	43.00	202.33	1011.65	$8104.53	$4.47	$ .065

Table No. 2.
Cost of Ribes Eradication by Types
Unit No. 2.

Type	Ribes per Acre R. lac.	R. vis.	Total	Acreage	Time Scout Days	Foreman Days	Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
1	294.0	33.1	327.1	123.90	4.85	28.10	145.20	$1019.16	$8.23	$ .025
2	1.5	.7	2.2	712.60	11.40	10.44	57.12	459.89	.65	.291
2B	64.2	557.2	621.4	18.40	1.62	3.62	15.65	120.74	6.56	.010
3	41.2	95.9	137.1	698.45	11.87	95.78	511.83	3537.92	5.07	.037
4	27.6	88.7	116.3	325.65	8.25	37.17	186.25	1327.61	4.08	.035
5	40.1	18.5	58.6	490.40	2.50	34.06	181.35	1242.02	2.53	.043
6	206.1	314.8	520.9	44.70	3.20	11.17	55.30	399.96	8.95	.017
7	56.3	1.6	57.9	30.80	.75	2.10	11.62	83.04	2.70	.047
	43.4	54.3	97.7	2444.90	44.44	222.44	1164.32	$8190.34	$3.35	$ .034

Table No. 3.
Cost of Ribes Eradication by Types.
Units 1 and 2, Combined

Type	Ribes per Acre R. lac.	R. vis.	Total	Acreage	Time Scout Days	Foreman Days	Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
1	280.0	27.8	307.8	149.40	6.85	32.85	168.95	$ 1216.71	$8.14	$.026
2	1.7	.6	2.3	1093.10	15.65	12.02	65.02	551.99	.50	.217
2B	55.1	36.8	91.9	281.40	5.62	18.62	90.65	727.53	2.59	.028
3	38.2	88.9	127.1	1347.65	31.37	225.78	1161.83	8685.14	6.44	.050
4	34.7	55.3	90.0	733.75	15.00	88.17	441.25	3340.28	4.55	.050
5	34.4	16.0	50.4	574.90	7.50	34.06	181.35	1278.82	2.23	.044
6	206.1	314.8	520.9	44.70	3.20	11.17	55.30	399.96	8.72	.016
7	49.8	3.0	52.8	34.80	2.25	2.10	11.62	94.44	2.71	.051
	39.2	46.7	85.9	4259.70	87.44	424.77	2175.97	$16294.87	$3.83	$.045

It will be noted that altho the average number of Ribes per acre was somewhat higher for Unit 2 than for Unit 1, the cost per acre was lower for Unit 2. Reference to the report of the methods study will show that the efficiency of Unit 2 was about 3% higher than that of Unit 1 by number of bushes and about 1% higher by feet of live stem. It is also recognized that the area covered by Unit " was more typical of average conditions than that covered by Unit 1, since Unit 1 was engaged for part of the season in working along the very irregular boundary of the 1924 area. For these reasons, namely, more Ribes per acre, higher efficiency, more typical working conditions, and lower costs, the work of Unit #2 has been quoted to the Western Blister Rust Conference as the representative of best results obtained by this office in experimental Ribes eradication, during the past year.

An examination of Tables 1 and 2 shows a considerable range in cost per acre, between the two units, for working some of the types. In three cases these ranges are so great as to require particular mention.

Unit #1 worked Type 2 at a cost of $.24 per acre; Unit #2 at a cost of $.64 per acre. The number of Ribes per acre is almost equal. The tables show that Unit #1 used a much greater proportion of scout days than of foreman and laborer days than did Unit #2 in this type. This resulted in a much lower cost. But Unit #1 secured an efficiency in Type 2 of only about 78.5%, on bushes over one foot high, while Unit #2 showed an efficiency, on a similar basis, of about 90%. It has heretofore been considered feasible to eradicate Type 2 by the scouting method. But if this method is to be used, a higher efficiency must be made.

Unit #1 worked Type 2B at a cost of $2.31 per acre; Unit #2 at a cost of $6.56 per acre. This difference was caused by the difference in Ribes per acre and in working conditions, altho both areas fell clearly within this type. The area of this type worked by Unit #2 was much more open than that worked by Unit #1. This is evidenced by the much greater number of Ribes, and also by the much higher ratio of R. viscosissimum to R. lacustre, the former species practically never occurring in profusion in a timber stand dense enough to give much shade. This open condition also gives rise to brush. This militates against rapid and cheap work, as it necessitates a closer interval between crew men and a shorter strip per day.

Unit #1 worked Type 5 for $.43 per acre; Unit #2 for $2.53 per acre. This is also due to differences in character of the areas worked. Unit #1 worked a Type 5 area representing a pole thicket, of sufficient age and density to have few Ribes. This was worked entirely by scouts. Unit #2 worked a Type 5 area of reproduction thicket, not old enough to discourage Ribes growth, and necessitating the use of crews working with a narrow interval between men.

Analysis of Costs

As the results of Ribes eradication are largely measured in terms of cost per acre, an analysis of the method used in determining these costs is of importance.

For determination of the factors of field cost for the two eradication units, the methods study and the ecological project, the following outline has been considered as inclusive.

1. Payroll

2. Subsistence
   a. Cost of supplies
   b. Cost of cooking
      (1) Cooks and flunkeys' pay.
      (2) Cooks and flunkeys' transportation.

   c. Transportation of supplies.
      (1) Truck or railroad.
      (2) Boat
      (3) Warehousing
      (4) Pack train.

3. Transportation of men.
   a. Railroad
   b. Stage
   c. Truck
   d. Boat
   e. Meals enroute.

4. Equipment.
   a. Proportional charge, old equipment
   b. Proportional charge, new equipment.
   c. Transportation of equipment.

The following explanation of some of the items in the above outline is given:

1. Payroll: actual wages paid to laborers, foremen, scouts and the Field Supervisors, for the period during which field work was actually in progress, including travel time.

2.a. Cost of subsistence supplies: Actual cost at Spokane for supplies purchased from the Forest Service Central Purchase Warehouse, or cost at Priest River, Idaho, of such perishable supplies as bread, meat, or fresh vegetables, purchased from local merchants.

2.c.(3) Warehousing: wages, subsistence, and transportation of two men handling supplies at Blister Rust Warehouse, head of Upper Priest Lake; rental of building for warehouse use. Cost apportioned to two eradication units, methods study or ecology study according to weight of

supplies and equipment packed from warehouse to camp and charged to each of these projects.

The following is a more detailed analysis of the warehouse costs and the method used in apportioning them to the several projects.

1. Payroll and transportation of men, for time chargeable to warehouse work - - - - - - -		$547.99
2. Rental of building for warehouse - - - - - -		10.00
3. Cost and transportation of food supplies used at warehouse - - - - - -	$298.77	
Pay and transportation of man's time chargeable to warehouse cooking - - -	148.60	
Total cost meals served at warehouse - -	$447.37	
No. meals served at warehouse - 1392		
Cost per meal - - $.32		
Total cost of 711 meals properly chargeable to warehouse work - - - - - -		227.52
Total cost of warehouse - - - - -		$785.51

Total weight food packed from warehouse - - -	36523 lbs.	
Total weight equipment packed from warehouse - -	12652 lbs.	
Total	49175 lbs.	

Percent warehouse cost chargeable to food transportation - 74% =	$581.28
Percent warehouse cost chargeable to equipment transportation - 26% =	204.23
Total	$785.51

Food packed to Unit #1 - -	16,798 lbs.	= 46.0%	= $267.39
Food packed to Unit #2 - -	17861 lbs.	= 48.9%	= 284.25
Food packed to Ecology Camp - -	1864 lbs.	= 5.1%	= 29.64
Total	36,523 lbs.	-100 %	$581.28

Equipment packed to Unit #1 - -	5700 lbs.	= 45.0%	= $91.91
Equipment packed to Unit #2 - -	5533 lbs.	= 43.7%	= 89.26
Equipment packed to Ecology Camp -	669 lbs.	= 5.3%	= 10.81
Equipment packed to Methods Party -	750 lbs.	= 6.0%	= 12.25
Total	12652 lbs.	100 %	$204.23

4. Equipment: one-third of the cost of all equipment is charged each year against the project using it. This presupposes that in 3 years all equipment will be worn out, destroyed, or broken. Certain types of equipment will greatly outlast this period, while others will not last more than one or two years. But the three year period is arbitrarily adopted as a sufficiently conservative average.

Tabulation of expenditures from field records and from the records of the Temporary Special Disbursing Agent at the Spokane office, according to the outline on page 26 shows the following:

Table No. 4.
Gross Charges to Each Project.

Charge	Eradication Unit #1	Eradication Unit #2	Methods Study	Ecological Study	Total
1. Payroll	$4835.30	$4987.30	$1749.20	$1749.20	$13473.31
2. Subsistence	2896.05	3240.75	---	291.46	6428.26
3. Transportation of men	218.88	217.20	97.78	59.30	593. 16
4. Equipment	458.92	392.67	78.45	56.83	986. 87
Total	$8409.15	$8837.92	$2077.74	$2156.79	$21481.60

The above figures represent gross, and not final, net, charges against the several projects. A further analysis of the subsistence costs is necessary, for the reason that the men assigned to the methods study "boarded" at the camp at which they happened to be working. Also, men from one camp would occasionally, in the course of their work, find it necessary to secure meals at another camp. To arrive at the true subsistence charge for each project, it is necessary to determine the cost per meal as served in each camp, and then to charge back the meals eaten by the various men to their proper project, irrespective of where the meals were eaten.

The cost per meal served at the camp of a given project depends upon the total number of meals served and the gross cost of the food (see Table 4). The following tables show the number of meals served at each project camp, the cost of those meals, and finally, in Table No. 7, the proper subsistence charge for each project.

Table No. 5.
No. Meals Served at Each Project Camp.

Meals Served To	Meals Served At				Total
	Eradication Unit #1 Camp	Eradication Unit #2 Camp	Ecology Camp	Warehouse	
Erad. Unit #1 Men	5448	227	13	172	5860
Erad. Unit #2 Men	76	6035	6	148	6265
Ecology Men	73	34	643	164	914
Methods Men	618	712	4	80	1414
Warehouse Men	---	---	---	711	711
Fire Fighters	187	722	---	106	1015
Visitors	61	52	5	11	129
Total	6463	7782	671	1392	16308

Table No. 6.
Cost of Meals.

Project Camp	No. of meals served	Gross Cost of Subsistence	Cost per Meal
Unit #1	6463	$2896.05	$ .448
Unit #2	7782	3240.75	.416
Ecology	671	291.46	.436
Warehouse	1392	447.37	.321
Total	16308	$6875.63	.421

Table No. 7.
Distribution of Meal Costs.

Meals Served To	Served at Unit #1 Camp			Served at Unit #2 Camp			Served at Ecology Camp			Served at Warehouse			Total Cost of Project
	No. of Meals	Cost per Meal	Total Cost	No. of Meals	Cost per Meal	Total Cost	No. of Meals	Cost per Meal	Total Cost	No. of Meals	Cost per Meal	Total Cost	
Unit #1 men	5448	$.448	$2440.70	227	$.416	$ 94.43	13	$.436	$ 5.67	172	$.321	$ 55.21	$2596.01
Unit #2 men	76	"	34.05	6035	"	2510.56	6	"	2.62	148	"	47.51	2594.74
Ecology men	73	"	32.70	34	"	14.14	643	"	280.35	164	"	52.64	379.83
Methods men	618	"	276.86	712	"	296.20	4	"	1.74	80	"	25.68	600.48
Warehouse men	---		---	---		---	---		---	711	"	228.23	248.97
Fire fighters	187	"	83.78	722	"	300.35	---		---	106	"	34.03	418.16
Visitors	61	"	27.33	52	"	21.63	5	"	2.18	11	"	3.53	33.93
Total	6463	"	$2895.42	7782	"	$3237.31	671	"	$292.56	1392	"	$446.83	$6872.12

<u>Note</u>: due to dropping of fourth place decimals in costs per meal, total gross subsistence costs per camp show a slight discrepancy from figures given in Table No. 4.

On the basis of the subsistence costs given in Table No. 7, Table No. 8 is constructed similar in form to Table No. 4, but with the subsistence figures corrected. It will be noted that this basis relieves each eradication unit of the cost of meals served to men on other projects, and also of the cost of meals served to fire fighters and visitors.

Table No. 8.
Net Charges to Each Project

Charge	Eradication Unit #1	Eradication Unit #2	Methods Study	Ecological Study	Total
1. Payroll	$4835.30	$4987.30	$1901.51	$1749.20	$13473.31
2. Subsistence	2596.01	2594.74	600.48	379.83	6171 .06
3. Transportation of men	218.88	217.20	97.78	59.30	593.16
4. Equipment	458.92	392.67	78.45	56.83	986.87
Total	$8109.11	$8191.91	$2678.22	$2156.79	$21224.40

The above tabulation gives only a total cost for each of the two eradication units. The method used in converting this total cost into cost per acre eradicated is as follows:

Tables 1, 2, and 3 show the number of laborer, foreman and scout days spent in eradication of each type. These represent the days actually spent in eradication work. For a given eradication unit, there is then determined the average daily wage paid to each of these 3 classes, laborers, foremen and scouts. This average daily wage is then multiplied by the actual number of working days spent by each class of labor in eradication. The total of these three sums gives a total labor charge for the time actually spent in work. This total labor charge is then deducted from the total cost of the field unit. The balance then represents all subsistence, transportation and equipment charges against this unit, plus all wages paid to the men which paid for work other than actual Ribes pulling, such as travel time, moving camp, camp detail, and such activities as building trails, installing telephone lines, etc. It also includes all salary, subsistence and travel costs of the Field Supervisor for the period of the field season. This balance is then divided by the total number of actual working days for laborers, scouts and foremen, the resulting figure being a composite charge for subsistence, travel, equipment, field supervision, and secondary activities such as trail and phone work, camp detail, etc. This composite charge is then added to the average daily wage for each class of labor, the resultant sum being the total cost per working man-day for each class. Total eradication costs for each type is then figured from these man-day costs and the time records, and the cost per acre secured by division.

The following shows the application of this method for each unit.

On the basis of the subsistence costs given in Table No. 7, Table No. 8 is constructed similar in form to Table No. 4, but with the subsistence figures corrected. It will be noted that this basis relieves [illegible] and also of the cost of meals served to fire fighters and visitors.

Table No. 8

Net Charges to Each Project

Items	Eradication Unit #1	Eradication Unit #2	Methods Study	Ecological Study	Total
1. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. Subsistence	[illegible]	[illegible]	[illegible]	379.[illegible]	[illegible]
3. Transportation [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4. Equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The above tabulation gives only a total cost for each of the two eradication units. The method used in converting this total cost [illegible] cost per acre eradicated is as follows:

Tables 1, 2, and 3 show the number of laborer, foreman and scout days spent in eradication of each type. These represent the days actually spent in eradication work. For a given eradication unit, there is then determined the average daily wage paid to each of these 3 classes, laborers, foremen and scouts. This average daily wage is then multiplied by the actual number of working days spent by each class of labor in eradication. The total of these three sums gives a total labor charge for the time actually spent in work. This total labor charge is then deducted from the total cost of the field unit. The balance then represents all subsistence, transportation and equipment charges against this unit, plus all wages paid to the men which paid for work other than actual Ribes pulling, such as travel time, moving camp, camp detail, and such activities as building trails, installing telephone lines, etc. It also includes all salary, subsistence and travel costs of the Field Supervisor for the period of the field season. This balance is then divided by the total number of actual working days for laborers, scouts and foremen, the resulting figure being a composite charge for subsistence, travel, equipment, field supervision, and secondary activities such as trail and phone work, camp detail, etc. This composite charge is then added to the average daily wage for each class of labor, the resultant sum being the total cost per working man-day for each class. Total eradication costs for each type is then figured from these man-daycosts and the time records, and the cost per acre secured by division.

The following shows the application of this method for one unit.

Unit #1

Average daily pay, scout - $3.75
" " " foreman - 3.23
" " " laborer - 2.72

43 scout days @ $3.75 $161.25
202.33 foreman days @ 3.23 653.53
1011.65 laborer days @ 2.72 2751.69
Total labor cost $3566.47

Total field cost of project	$8109.11
Total labor cost	3566.47
Balance	4542.64

Total man-days = 1256.98

$\frac{\$4542.64}{1256.98}$ = \$3.61 composite charge per man-day.

Total cost scout day = \$3.75 + \$3.61 = \$7.36
" " foreman day = \$3.23 + \$3.61 = \$6.84
" " laborer day = \$2.72 + \$3.61 = \$6.33

Unit #2.

Average daily pay, scout - $3.75
" " ", foreman - $3.26
" " ", laborer - $2.73

44.44 scouts days at $3.73 - $165.76
222.44 foreman days at 3.26 - 725.15
1164.32 laborer days at 2.73 - 3178.59
Total labor cost $ 4069.50

Total field cost of project	$8191.91
Total labor cost	4069.50
Balance	$4122.41

Total man-days = 1431.20

$\frac{\$4122.41}{1431.20}$ = \$2.88 composite charge per man-day.

Total cost scout day = \$3.73 + \$2.88 = \$6.61
Total cost foreman day = \$3.26 + \$2.88 = \$6.14
Total cost laborer day = \$2.73 + \$2.88 = \$5.61

A comparison of the figures given for the total cost of work for the two units in Tables 1 and 2 and in Table 4 will show a slight discrepancy. This is due to the dropping of third and fourth place decimals in Tables 1 and 2, and will affect the cost per acre only a small fraction of a cent.

It will be noted that the composite charge per man-day is $.73 per day higher for Unit #1 than for Unit #2. Two obvious reasons can be given for this difference. First, the cost per meal served at Unit #1 Camp was $.032 higher than in Unit #2 camp. (See Table 6.) Had Unit #1 served its 6463 meals for the same cost as Unit #2, a saving of $206.82 would have resulted. Secondly, the salary of the Field Supervisor of Unit #1 was $70 per month higher, or $210 for the season, than the salary of the Field Supervisor of Unit #2. Such a reduction on these two items alone would have reduced the composite man-day charge for Unit #1 to $3.28, a saving of $.33 per working man-day.

The remaining difference in the composite man-day charges for the two units is attributable to the ratio between the possible working days and the days actually worked by the men. The actual number of working days will never equal the days for which the men were paid, because this total time must include travel time and such minor activities as phone installation, trail repairing, moving camp and camp detail.

An analysis of the time records shows that the men in Unit #1 were paid by this Office for 1497 days, (this exclusive of all fire time and any time while on compensation for injury). Table 1 shows that 1257 days were spent on actual eradication, thus leaving a balance of 240 days on which no eradication was done. Reducing this to the basis of a single man-day, it shows that 16%, or over 1¼ hours of each day, were not spent on actual eradication. A similar analysis for Unit #2 shows that of 1557 paid days, 1431 (see Table No. 2) were spent on actual eradication. This leaves a balance of 126 days, or 8%, or 38½ minutes of each man-day not spent on actual eradication. This difference will fully account for the balance of the higher composite man-day charge of Unit #1.

Fire Fighting.

At the beginning of the 1925 field season, a definite agreement was made between the Spokane office and the Kaniksu National Forest, relative to the use of men employed by this Office in fighting forest fire. A copy of this agreement is here given.

A comparison of the figures given for the total cost of work for the two units in Tables 1 and 2 and in Table 4 will show a slight discrepancy. This is due to the dropping of third and fourth place decimals in Tables 1 and 2, and will affect the cost per acre only a small fraction of a cent.

It will be noted that the composite charge per man-day is $.73 per day higher for Unit #1 than for Unit #2. Two obvious reasons can be given for this difference. First, the cost per meal served at Unit #1 camp was $.[illegible] higher than in Unit #2 camp. (See Table 5. Had Unit #1 served its [illegible] meals for the same cost as Unit #2, a saving of $206.82 would have resulted. Secondly, the salary of the Field Supervisor of Unit #1 was $[illegible] per month higher, or $[illegible] for the season, than the salary of the Field Supervisor of Unit #2. Such a reduction on these two items alone would have reduced the composite man-day charge for Unit #1 to $3.28, a saving of $.23 per working man-day.

The remaining difference in the composite man-day charges for the two units is attributable to the ratio between the possible working days and the days actually worked by the men. The actual number of working days will never equal the days for which the men were paid, because this total time must include travel time and such minor activities as phone installation, trail repairing, moving camp and camp detail.

An analysis of the time records shows that the men in Unit #1 were paid by this Office for 1497 days, (this exclusive of all fire time and any time while on compensation for injury). Table 1 shows that 1257 days were spent on actual eradication, thus leaving a balance of 240 days on which no eradication was done. Reducing this to the basis of a single man-day, it shows that 16%, or over 1¼ hours of each day, were not spent on actual eradication. A similar analysis for Unit #2 shows that of [illegible] paid days, [illegible] (see Table No. 2) were spent on actual eradication. This leaves a balance of 126 days, or 8%, or 33⅓ minutes of each man-day not spent on actual eradication. This difference will fully account for the balance of the higher composite man-day charge of Unit #1.

Fire Fighting.

At the beginning of the 1925 field season, a definite agreement was made between the Spokane office and the Kaniksu National Forest, relative to the use of men employed by this Office in fighting forest fire. A copy of this agreement is here given.

Cooperative Fire Fighting Agreement Between the Forest Service and the Office of Blister Rust Control - 1925.

1. The Office of Blister Rust Control agrees to furnish men to the limit of their personnel (approximately 70 men) to fight fire in the entire Upper Priest River and Hughes Fork Watersheds. They will take initial action on all Class A & B fires within this area but it is understood and agreed that the Forest Service will send men to such fires whenever possible. As soon as possible after a fire assumes class C. proportions the Blister Rust men to be replaced by men hired by the Forest Service, but it is understood and agreed that the Forest Service men in charge of the fire will decide when these men can be spared or replaced without danger of losing control of the fires. The Forest Service agrees to assume responsibility for the suppression of all big fires and to supervise the work thereon.

2. The Office of Blister Rust Control to supply men for fires outside this area only during an extreme emergency, men from outside will be ordered at the same time the Blister Rust men are ordered. The Blister Rust men to be relieved as soon as men can be brought in from outside, and within two days if possible. If, however, at the time these replacements arrive at the fire, additional men are necessary for the control of the fire, a requisite number of blister rust men will be held until additional replacements can be supplied, these to be ordered immediately from the outside. It is understood that blister rust men will be held to patrol such a fire only when other men cannot be secured. This to apply only in cases where blister rust men can reach the fire sooner than men from outside or when outside help cannot be secured.

3. The Forest Service agrees to pay men obtained from the Office of Blister Rust Control at the regular fire fighters rate. Foremen and crew leaders to be paid at the same rate as they receive for regular work. Reasonable travel time will be allowed but no rest period will be granted The Forest Service agrees to reimburse the Office of Blister Rust Control for subsistence furnished to these or other men while they are on fire fighting time.

4. The Office of Blister Rust Control agrees to instruct their employees to keep constant lookout for fires and report same immediately to the nearest lookout or fireman. The Office of BlisterRust Control agrees to start men immediately to such fires if they occur within the Upper Priest River or Hughes Fork Valleys. The Office of Blister Rust Control further agrees that employees will be instructed to build camp fires only in permanent camps in regularly provided fire places which have been cleared to mineral soil; further agreed that these men shall not smoke outside of regular camps and will be instructed to always use extreme care with fire in the woods. All provisions of this clause will be rigidly enforced and any breach will be subject to disciplinary action.

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5. The Forest Service agrees to furnish telephone instruments (wall or test sets) and equipment and the Office of Blister Rust Control agrees to build and maintain the necessary stub lines. The Office of Blister Rust Control further agrees to have a man at the headquarters camp at all times to answer the telephone.

6. The Forest Service agrees to furnish fire fighting tools. The Office of Blister Rust Control agrees to maintain these tools intact and in good condition and not to use them for any purpose but for fighting fire. Such tools and equipment to be put in good condition immediately after being returned from a fire. Time and wages will be allowed for this work from fire fund.

7. A copy of this agreement should be forwarded to each Ranger in the district and to each Blister Rust field supervisor in order that no controversies may arise.

Signed this 9th day of May, 1925.

(s.) Stephen N. Wyckoff,
Associate Pathologist.

(s.) J. C. Whitham
Forest Supervisor, Kaniksu National Forest.

The 1925 fire season was one of unusual severity on the Kaniksu National Forest. A long dry period, accompanied by numerous electrical storms, started a large number of fires which proved difficult to suppress. As a result, a considerable amount of time was spent by the employees of this office on fire work. In response to the assistance given by our men, the following letter was received from Mr. J. C. Whitham, Supervisor of the Kaniksu National Forest.

United States Department of Agriculture
Forest Service
Kaniksu National Forest.

O — Newport, Washington.
Fire Cooperation - Kaniksu — August 29, 1925

Mr. Stephen N. Wyckoff,
Office of Blister Rust
618 Realty Bldg.
Spokane, Washington

Dear Mr. Wyckoff:

As Supervisor of the Kaniksu National Forest, I wish to express my appreciation of the excellent spirit of cooperation which characterized the work of your men on the forest this season when called to assist in suppressing forest fires.

I know that it has been a serious set-back to your own plans and work to have the men taken off so often to assist in fighting fires and I also know that fighting fire is by no means a desirable job and that it meant considerable inconvenience and discomfort to your men to do the good work which they have done throughout the season in suppressing the unusual number of fires which occurred on the forest.

I understand that on account of your cooperation of fire it will probably not be possible to cover any of the Upper Hughes Fork Drainage and it will even be difficult to complete the Upper Priest River Drainage this season. These facts are both regretted but under the circumstances the delay was unavoidable and I am writing this letter simply to let you and the men know that I appreciate your problems and that the Forest Service feels that the Blister Rust has rendered them a service which means a whole lot to the future welfare of the Kaniksu

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Forest Service
Kaniksu National Forest.

Fire Cooperation - Kaniksu [illegible]

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Office of Blister Rust
618 Realty Bldg.
Spokane, Washington

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Forest. It will probably be a long while before we will ever be confronted with a situation as we were this season and the response that the Blister Rust organization has given in the emergency will not be forgotten.

Very truly yours,

J. C. WHITHAM, Forest Supervisor

by (s.) J. C. Whitham

JCW/GOM

An analysis of the time records of the Spokane office shows the following condition.

Table No. 9.
Time Analysis.

Month	Total Time (man-days)	Fire Time (man-days)	Percent of Total Time on Fire
June	873 ¼	---	0
July	1879	245 ¼	13
August	1740 3/4	693 ½	40
September	361 ½	---	0
Total	4854 ½	938 3/4	19.3

This table shows that for the entire season, over 19% of the available working time was spent on fire. Furthermore, during July and August, the two most effective months for Ribes eradication, over 25% of the available time was spent on fire. This results not only in a 19% decrease in actual area covered, but in a lowering of efficiency and hence an increase in the costs.

The entire matter of the use of Ribes eradication men on fire must come up for discussion and settlement. If Ribes eradication crews are to be used in fire fighting, pine owners must be prepared to face a higher cost for local control.

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[illegible]

JCW/GOM

An analysis of the time records of the Spokane office shows the following condition.

Table No. 9.
Time Analysis.

Month	Total Time (man-days)	Fire Time (man-days)	Percent of Total Time on Fire
June	[illegible]	---	[illegible]
July	[illegible]	[illegible]	12
August	[illegible] 2/3	[illegible]	[illegible]
September	[illegible]	---	[illegible]
Total	[illegible]	[illegible]	[illegible]

This table shows that for the entire season, over 19% of the available working time was spent on fire. Furthermore, during July and August, the two most effective months for Ribes eradication, over 25% of the available time was spent on fire. This results not only in a 19% decrease in actual area covered, but in a lowering of efficiency and hence an increase in the costs.

The entire matter of the use of Ribes eradication men on fire must come up for discussion and settlement. If Ribes eradication crews are to be used in fire fighting, pine owners must be prepared to face a higher cost for local control.

Season's Report
Methods and Checking, Idaho,
by
J. L. Bedwell, Assistant Pathologist.

Purpose of Project

The duties of the methods organization is the testing and improving of methods of eradication now in use and the introduction of new methods. It was thought that the checking work should be done by the same organization as the one engaged in methods study since the checking gives the best indication of incorrectness in methods, assists in the analysis of methods, and suggests ideas as to how to improve methods of work. With this preconceived idea of the work the checking and methods studies work was done by the same crew.

Organization of Crew

The methods and checking crew as organized for the 1925 field season consisted of the field supervisor, one foreman, two recorders and two assistants. The foreman was directly in charge of the crew, only the general outline of experiments and checks being given to him by the project field supervisor.

Plan of Work

The crew was operated as a mobile unit moving from one eradication camp to another in order to keep up with the eradication work. For this reason no cooking equipment was provided, the crew getting their meals from the camp at which they were stopping. A charge was made for meals eaten at these camps and the proper deduction made on the season's cost records.

Most of the methods experiments were performed by the crew as a unit. The checking work was done either by two man crews, a recorder and an assistant, or by the five men in crew formation. Data were taken by the recorder on the enclosed form #12.

The following list of instructions for checking work was given to each member of the crew:

Instructions to Checkers

Time to Check: Checking of a block should be done while the crew is still working but has just about finished the block. Checkers must make sure that area checked has been eradicated, by cooperation with the crew foreman.

WF#12-ER

WF#12-BRC-o-1-25

RIBES CHECK - FIELD RECORD

State__________ Unit__________ Date__________ Time__________

Block No.__________ No. Acres in Block__________ Age Class__________

Worked by Scout__________ Density of Ground Cover__________ Type__________

Foreman__________ Time spent eradication__________

Difficulty of working__________ Checked by__________

Location of Plot__________ No. Ribes pulled by crew__________

Strip__________

Plot Strip No.	Area of Plot or Strip	Ribes Species	No. Feet Leaf Bearing Stem											No. Ribes by Ht. in Ft.												
			½	1	3	5	10	25	50	75	100	Over 100	Total Leaf B. S.	½	1	2	3	4	5	5 & Up						

Location of checking areas:

Plots: for our western work we have decided to standardize on 1/10 acre plots for all advance plot checking. Naturally advance plots should be chosen where Ribes occur.

Strips: check strips should be run so as to cross all Ribes types (eradication types) in such a way that average conditions will be encountered. Parallel strips 1 rod ($16\frac{1}{2}$) wide every $12\frac{1}{2}$ chains thru a block from one edge to the other will give a 2% check.

Marking of checked areas:

Plots: plots should be permanently marked for future checking or ecological study. At least one corner should have a permanent natural mark (if possible) such as a tree or rock. The other corner should be marked with a stake and witnessed and notes giving bearings and distance between corners taken so they can be easily relocated. The plot should then be tied in to some permanent point as trail or stream intersection, section or quarter corner.

Strips: Starting point of the strip should be tied in to some permanent point as in the case of plots. This starting point should be permanently marked and witnessed and notes taken giving magnetic bearing and length of strip.

Percentage of eradicated area to be checked: at least 2% of every block eradicated should be checked by strips. This percentage will tend to insure average general conditions being encountered as to Ribes concentrations and efficiency of work. Advance plots to be extra acreage and for some special study or purpose.

Impartiality in checking: it is very important that all checking be conscientious, honest, and impartial.

Checks on Eradication Blocks

It was the aim of the checking organization to check not less than two percent of each block eradicated. To obtain a two percent check a check strip one rod wide was run every twelve and a half chains apart in each block. The arbitrary spacing of strips removed any possibility of personal element entering into the location of the strips. The courses of the strips were determined in advance by the methods supervisor or by the foreman of the methods crew and they were selected so as to run diagonally across the topography, it being thought that in that way the best average conditions would be encountered. The results of these checks are shown in Table I.

Location of checking areas:

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Strips: check strips should be run so as to cross all types (eradication types) in such a way that average conditions will be encountered. Parallel strips 1 rod (16½') wide every 12½ chains across a block from one edge to the other will give a 2% check.

Marking of checked areas:

Plots: plots should be permanently marked for future checking or ecological study. At least one corner should have a permanent natural mark (if possible) such as a tree or rock. The other corner should be marked with a stake and witnessed and notes giving bearings and distance between corners taken so they can be easily relocated. The plot should then be tied in to some permanent point as trail or stream intersection, section or quarter corner.

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Table I.
Results of Checking on Eradication Blocks.

Unit 1.

Block	Area of Block	% of Block Checked	Difficulty of Working	No. of Ribes Pulled Per Acre	No. of Ribes Missed per Acre			% Efficiency of Eradication		
					All Bushes	Over 6"	Over 1'	All Bushes	Over 6"	Over 1'
1	39.0	2.3	Medium	310.3	57.7	43.3	24.4	84.33	87.76	92.71
2	315.0	1.8	Medium	105.5	3.7	3.0	1.2	96.62	97.24	98.88
3	195.0	2.3	Medium	31.6	2.6	2.2	.6	92.40	93.50	99.38
4	220.0	.03	Medium	63.5	35.0	31.6	20.0	64.47	66.78	76.05
5	252.5	1.2	Easy	6.3	.6	.6	.6	91.31	91.31	91.31
6	275.0	1.5	Hard	9.1	.2	.2	.2	97.85	97.85	97.85
7	132.0	1.3	Hard	228.8	39.4	34.1	19.4	85.31	87.03	93.13
8	4.0	15.0	Medium	591.5	8.3	8.3	3.3	97.27	97.27	98.89
9	276.0	2.0	Easy	56.0	37.8	30.8	15.3	59.71	64.52	78.55
Totals & Averages	1708.5	1.53		68.8	16.43	13.48	6.78	80.76	83.62	91.03

Unit 2.

Block	Area of Block	% of Block Checked	Difficulty of Working	No. of Ribes Pulled per Acre	No. or Ribes Missed per acre			% Efficiency of Eradication		
					All Bushes	Over 6"	Over 1'	All Bushes	Over 6"	Over 1'
1	166.2	1.3	Easy	44.9	15.6	11.7	8.6	74.22	79.33	83.93
2	183.8	1.8	Easy	110.3	24.7	20.0	9.1	81.71	84.66	92.38
3	306.4	1.9	Easy	111.3	15.2	12.3	4.9	87.99	90.05	95.79
4	290.8	2.6	Easy	13.8	3.0	2.6	1.97	82.15	84.15	87.51
5	274.2	2.5	Medium	165.9	22.7	12.3	3.9	87.97	93.10	97.71
7	301.2	1.5	Medium	79.3	16.8	12.1	4.4	82.52	86.77	94.75
8	194.2	2.5	Medium	78.0	10.4	8.2	5.4	88.24	90.49	93.53
9	152.7	1.9	Medium	104.3	29.3	22.0	12.0	77.98	82.59	89.69
11	257.7	2.7	Hard	170.1	17.3	15.2	10.4	90.77	91.80	94.24
12	255.9	1.2	Hard	86.3	11.2	9.3	5.6	88.51	90.28	93.91
Totals & Averages	2383.1	2.01		97.47	15.90	11.95	6.20	85.97	89.08	94.02

Units 1 and 2 Combined

Block	Area of Block	% of Block Checked	Difficulty of Working	No. of Ribes Pulled per Acre	No. of Ribes Missed per Acre			% Efficiency of Eradication		
					All Bushes	Over 6"	Over 1'	All Bushes	Over 6"	Over 1'
Totals & Averages	4091.6	1.81		85.7	16.38	12.49	6.11	83.96	87.28	93.49

Checks on Crew Efficiency

In addition to this two percent check made by check strips, an attempt was made to check the work done in one day by each crew each month. Circumstances such as fire, pressure of other work, etc., prevented this being carried out to the letter, but at least two crews in each unit were checked each month and in most cases more than two were checked. This check constituted a 100% check as all the area worked by a crew on the specific day was checked and an accurate record was kept of the Ribes pulled by the crew and those pulled by the checkers. This checking was done by the entire methods organization working in crew formation, proceeding very carefully and making a very thorough search for missed Ribes of all sizes. Tables II and III show the results of these crew checks.

Table No. II.
Checks on Crew Efficiency

Unit No. 1.

June

Foreman	Area of Plot in Acres	No. of Ribes Eradicated	No. of Ribes Missed	No. of Ribes Missed per Acre	Percentage Efficiency All Bushes	6" & Over Only	Over 1 Ft. Only	Difficulty of Working	Difficulty of going to & returning From Work
Brown	8.6	204	26	3.02	88.70	90.27	93.16	Easy	Easy
Henneberg	10.3	98	25	2.42	79.68	81.67	86.73	Medium	Hard
Sokolnikoff	5.2	146	13	2.50	91.83	91.83	92.46	Medium	Easy
Walters	4.0	71	13	3.25	84.53	86.59	93.43	Very Easy	Easy
Average					86.94	88.57	92.68		

July

Foreman	Area of Plot in Acres	No. of Ribes Eradicated	No. of Ribes Missed	No. of Ribes Missed per Acre	Percentage Efficiency All Bushes	6" & Over Only	Over 1 Ft. Only	Difficulty of Working	Difficulty of going to & returning from work
Brown	4.0	808	61	15.25	92.99	94.07	96.42	Hard	Easy
Henneberg	9.0	784	161	17.88	82.97	85.97	91.17	Medium	Hard
Sokolnikoff	5.6	576	48	8.57	92.31	92.91	95.68	Medium	Medium
Walters	5.0	435	60	12.00	87.88	92.75	96.89	Medium	Easy
Average					88.75	91.02	94.69		

August

Foreman	Area of Plot in Acres	No. of Ribes Eradicated	No. of Ribes Missed	No. of Ribes Missed per Acre	Percentage Efficiency All Bushes	6" & Over Only	Over 1 Ft. Only	Difficulty of Working	Difficulty of going to & returning from work
Brown	2.0	683	138	69.00	83.20	85.59	92.93	Very Hard	Easy
Henneberg	6.0	560	214	35.66	72.36	75.38	83.71	Medium	Easy
Sokolnikoff	5.0	690	75	15.00	90.20	90.56	94.40	Medium	Easy
Average					81.91	83.94	90.54		

Table No. III
Checks on Crew Efficiency
Unit No. 2.

June

Foreman	Area of Plot in Acres	No. of Ribes Eradicated	No. of Ribes Missed	No. of Ribes Missed per Acre	Percentage Efficiency			Difficulty of Working	Difficulgoing to & returning from work
					All Bushes	6" & Over Only	Over 1 Ft. Only		
Eldridge	11.67	985	182	15.59	84.41	89.55	94.71	Easy	Easy
Johnston	6.0	389	46	7.66	89.43	91.53	94.88	Easy	Easy
Swanson	9.0	856	44	4.88	95.12	97.06	98.06	Easy	Easy
Average					89.13	92.65	96.04		

July

Foreman	Area of Plot in Acres	No. of Ribes Eradicated	No. of Ribes Missed	No. of Ribes Missed per Acre	Percentage Efficiency			Difficulty of Working	Difficulgoing to & returning from work
					All Bushes	6" & Over Only	Over 1 Ft. Only		
Eldridge	3.3	2200	122	36.96	94.75	96.67	98.70	Medium	Very Easy
Erickson	11.0	1045	91	8.27	91.99	92.98	95.09	Medium	Very Easy
Johnston	30.0	1132	433	14.43	72.35	73.37	79.22	Medium	Hard
Swanson	11.0	830	112	10.18	88.12	89.53	94.43	Medium	Very Easy
Average					88.77	90.23	94.03		

August

Foreman	Area of Plot in Acres	No. of Ribes Eradicated	No. of Ribes Missed	No. of Ribes Missed per Acre	Percentage Efficiency			Difficulty of Working	Difficulgoing to & returning from work
					All Bushes	6" & Over Only	Over 1 Ft. Only		
Eldridge	4.6	722	69	15.00	91.28	93.16	94.26	Medium	Easy
Bell	2.0	1450	123	61.50	92.19	93.49	96.67	Medium	Easy
Average					91.88	93.50	96.45		

Efficiency of Eradication of Different Species of Ribes

Data were kept as to the number of each species of Ribes missed by the eradication crews and a compilation made to show the percentage missed by each unit. The results of this compilation will be found in Table IV.

Table No. IV.
Eradication Efficiency by Species

Unit	No. of Ribes Pulled per Acre		Number of Ribes Missed Per Acre						Percentage Efficiency of Eradication					
			All Bushes		Over 6"		Over 1 Ft.		All Bushes		Over 6"		Over 1 Ft.	
	lac.	visc.	lac.	visc.	lac.	visc	lac.	visc.	lac.	visc.	lac.	visc.	lac.	visc.
No. 1	34.15	34.71	10.30	4.51	8.45	3.60	4.54	2.14	76.83	88.51	80.17	90.06	88.27	94.20
No. 2	43.73	53.74	5.49	10.12	4.44	7.26	2.28	3.79	88.85	84.16	90.79	88.10	95.05	93.42
Total & Ave.	39.73	45.80	7.18	8.14	5.99	5.97	3.08	3.21	84.70	84.91	86.90	88.47	92.81	93.46

It is interesting to note that Unit No. 1 had a higher Ribes viscosissimum efficiency than they did on R. lacustre efficiency and that the reverse obtained for Unit No. 2. This table also shows that Unit No. 1 had a higher R. viscosissimum efficiency than Unit No. 2 but that Unit No. 2 had the higher R. lacustre efficiency. No reason is known for this difference.

Rechecking of 1924 Eradication

The area eradicated in 1924 was rechecked this season (1925). The reasons for rechecking this work were (1) to conform with the newly adopted policy of having all checking work done by a checking crew which was entirely separate and independent of the eradication projects (2) tohave the same percentage check on that area as on the area eradicated this year and (3) to have the checking done by the same crew and by the same methods for both years work. Table V shows the results as found by the checking work.

Table No. V.
1924 Eradication
Checked in 1925

Acres Checked	No. Ribes Pulled Per A.	No. Ribes Missed per Acre			% Efficiency of Eradication		
		All Bushes	Over 6"	Over 1'	All Bushes	Over 6"	Over 1'
157.6	41.5	12.9	9.0	5.6	76.29	82.18	88.12

Site of Missed Ribes

A list, according to the site on which it was found growing, was kept for each Ribes bush checked during the season. This list as prepared is better for Ribes lacustre sites than for R. viscosissimum sites. The record of this work is shown in Table VI.

Table No. VI.
Site of Missed Ribes

Site	% of Total Missed Ribes
Rock outcrops	10.1
Raised ground adj. mature trees	5.5
Damp slope	4.6
Alder bottoms	4.0
Upturns	2.9
Windfalls, on, under or behind	11.0
Dry draws	1.2
On decayed stumps or logs	9.3
Mulch of decayed branches	13.8
In dense brush	8.9
On creek banks	3.0
Covered by pulled Ribes	.4
Openings in types 3 and 4	19.3
In reproduction	6.0
Total	100.0

Next season an attempt will be made to keep a separate list of site of missed bushes according to species since there is quite a difference in the habitat of the two species.

Relation of missed Ribes to adjacent brush

In order to know the probable pathological importance of missed Ribes bushes from the standpoint of screening by brush and reproduction and also to help in an analysis of reasons for missing Ribes, a record was kept for every bush checked showing its relationship to adjacent brush. Table VII gives the summary of this study.

Table No. VII
Relation of Missed Ribes to Adjacent Brush
(or Reproduction)

Height of Ribes	% of Total Missed Ribes
Lower than brush	28.4
Even height with brush	12.5
Higher than brush	20.0
No brush close to Ribes	39.1
Total	100.0

The sheet inserted is a copy of the field sheet for recording the relation of missed bushes to adjacent brush and the site of missed Ribes. (Form #11)

Relation of efficiency to types encountered on strip

In eradicating blocks, in which more than one type is represented, efficiency seemed to drop abruptly at the type boundary and then gradually to rise again. This is probably due to differences in density of brush, number of Ribes, different species of Ribes, difference in light conditions due to shading, density of timber, etc. on the different types.

This point should be called to the attention of crew foreman so they can be especially observant when going from one type to another and can caution the men and even mention the points which might help them.

Cost of checking eradicated areas

Table VIII gives the cost of checking the 1924 and 1925 eradicated areas, which were checked during the 1925 field season.

Table No. VIII

Activity Cost Record of Methods and Checking Crew

1925

Activity	Salary				Subsistence	Transportation	Equipment	Supervision	Total cost
	Crew Work	Travel	Moving Camp	Sundays & Holidays					
Checking	$ 593.92	$33.57	$29.81	$101.20	$327.32	$52.95	$42.48	$141.65	$1322.90
Methods	502.67	28.42	25.24	85.69	277.14	44.83	35.97	301.27	1301.23
Total	$1096.59	$61.99	$55.05	$186.89	$604.46	$97.78	$78.45	$442.92	$2624.13

The different activities are itemized but some explanation may be necessary to make them properly understandable. Under the general heading of salary there are four items showing for just what activity the total amount of salary was paid. Crew work is for time actually spent in running strip checks by the two man crews. Travel is time spent in going from official station to place of work at the camp in Upper Priest River in the spring and returning to official station in the fall. Moving camp covers salary paid for time spent in packing, moving and establishing camps. Sundays and Holidays is time spent in observance of those days and for which salary was paid to men under appointment.

The sheet inserted is a copy of the field sheet for recording the relation of missed bushes to adjacent brush and the site of missed Ribes. (Form #11)

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Table No. VIII

Activity Cost Record of Methods and Checking Crew

1925

Activity	Salary: Crew Work	Salary: Travel	Salary: Moving Camp	Salary: Sundays & Holidays	Subsistence	Transportation	Equipment	Supervision	Total cost
Checking	533.15	133.57	235.57	101.20	1327.23	133.95	123.4[illegible]	[illegible]	[illegible]
Methods	503.67	31.42	25.24	33.53	377.14	44.53	33.27	[illegible]	[illegible]
Total	1036.82	161.91	261.05	133.73	1804.40	177.71	[illegible]	[illegible]	[illegible]

The different activities are itemized but some explanation may be necessary to make them properly understandable. Under the general heading of salary there are four items showing for just what activity the total amount of salary was paid. Crew work is for time actually spent in running strip checks by the two man crews. Travel is time spent in going from official station to place of work at the camp in Upper Priest River in the spring and returning to official station in the fall. Moving camp covers salary paid for time spent in packing, moving and establishing camps. Sundays and Holidays is time spent in observance of these days and for which salary was paid to men under appointment.

SITE OF MISSED RIBES

Site	No.of Missed Ribes	% of Total Missed Ribes	Remarks
Rock outcrops			
Raised ground adj. mature trees			
Damp slope			
Alder bottoms			
Upturns			
Windfalls on,under,or behind			
Dry draws			
On decayed stumps or logs			
Mulch of decayed branches			
In dense brush			
On creek banks			
Covered by pulled Ribes			
Total			

RELATION OF MISSED RIBES TO ADJACENT BRUSH (Or repro.)

Height of Ribes	No. Missed	% of Total Missed Ribes	Remarks
Lower than brush			
Even height with brush			
Higher than brush.			
No brush close to Ribes			
Total			

Note: Are missed Ribes of general or localized distribution?

The following explanation will probably cover the rest of the table which consists of single items not under a general head. Subsistence is the cost of total meals eaten at the eradication camps, the ecology camp or at the warehouse. Transportation is the amount paid for railroad fare, stage fare and boat fare and for meals eaten enroute for the travel as described for the travel column under salary. Equipment is cost of equipment and the railroad, truck, boat and packing costs involved in getting it to and from the field and in moving it from one camp to another. The supervision item covers the salary and expenses of the field supervisor during the field season and is divided between the two sub-projects according to the amount of time devoted to each.

<u>Checking cost per acre</u>

Area covered by checking - 11,970.6 acres.

Total cost of checking - $1,322.90

Cost per acre - $.110

<u>Experimental work in eradication methods</u>

During the progress of the season's work observations were made of lost motion and lost time by eradication crews, concentrations of Ribes missed, improper removal of Ribes roots, improper laying of paper trail, distances to and from camps to work, differences in difficulty of work on different areas, etc.

As a result of these observations and observations made the previous season, an attempt was made to analyze the reasons and the results and experiments were performed to try to correct the faulty methods responsible. Some additional experiments were performed which it was thought might tend to increase efficiency and lower costs.

The following is an outline of the experiments which were tried.

I. Paper trail.

A. What kind of paper is easiest to lay.
B. What kind of paper offers the best visibility.
C. What kind of paper maintains visibility longest.
D. What is the best manner of laying paper trail from standpoint of economy in laying and following.

II. Which Ribes tools are best for the complete removal of Ribes roots.

III. Best size and formation of crews to obtain the greatest acreage and highest efficiency.

IV. Up and down hill versus horizontal strip eradication.

V. Is low efficiency caused by too wide an interval or too much speed.

VI. Effect of lapses in attention on efficiency of eradication.

VII. Analysis of difficulty factors of eradication.

VIII. Relation of time of day to efficiency of eradication.

IX. Distance from camps to work and resulting loss in time and efficiency.

Details of Experiments in Methods

1. Trail paper: On eradication work previous to the 1925 season the ordinary rough news print paper cut in 3.5 inch squares was used for laying paper trail. Although being cheap this paper had the disadvantage of being hard to lay due to the difficulty in shuffling or separating the sheets and to its yellowing when exposed to the sunlight and rain. "The idea had been conceived prior to this time that glazed paper would be much better than news print, due to its characteristic of not sticking together, and thus allowing a great saving in time in its use. Consequently a small shipment of this glazed paper was sent out to the camps on Upper Priest River and given a trial." Before having the crews use the glazed paper some small scale experiments were made on visibility, ease of separating sheets, and number of sheets in a given weight of paper of each kind. There was found to be an average of 957 pieces of news print and 843 pieces of glazed paper to the pound, papers cut 3.5 inches x 3.5 inches in each case. In counting the sheets in a pound of each kind of paper an accurate record was kept of the time necessary to count the sheets. The time averaged $25\frac{1}{2}$ minutes for the news print and 17 minutes for the glazed paper. Considering the difference in number of sheets of each kind this gave approximately $5\frac{1}{2}$ minutes gain of glazed over news print paper due to ease in shuffling.

$$957 : 25.5 = 843 : 22.4+$$

$$22.4+ - 17 = 5.4+$$

To determine the visibility and the effect of weathering on the two kinds of paper ten sheets of each kind were nailed on a plank and exposed to the sun. Water was poured over the sheets once every day for ten days. At the end of this time the glazed paper was easily

visible at three times the distance at which the news print could be seen.

On the strength of the results obtained in the above experiments, the crews were given glazed paper to try on a larger scale experiment. "This first trial brought complaints from the crew men that it was too heavy. Believing that this paper would finally prove to be the better grade because of its qualities and supposing that it would be used almost as extravagantly as news print paper we began to figure on some remedy for this single disadvantage. Our investigations brought out the fact that, due to the greater visibility of glazed paper, it could be used in smaller sized pieces and less freely without effecting the efficiency of the crew men." Sheets of paper cut 2 inches by 4 inches (instead of 3.5 x 3.5) gave 1290+ sheets to the pound and these sheets dropped at from one half to two thirds the frequency of the news print paper gave a paper trail as easy to follow and a resulting saving in time by the man laying trail, and naturally a saving of from one half to two thirds the weight of paper.

After these preliminary experiments the glazed paper was used during the balance of the 1925 field season. To find what the difference in cost of the two kinds of paper was the records of the last two years purchases were examined and the findings tabulated below. The news print paper was old Spokane Daily Chronicles purchased at the office of the paper and the glazed paper was old Saturday Evening Posts purchased at the central agency. The cutting was done both years by the Buckeye Printing Co., and is charged for at a fixed rate per hour. The difference in cost of cutting is explained by the greater ease of handling old Posts which hold their shape and can be evened up better.

Table No. IX.

	Cost per Cwt.	Cutting per Cwt	Transportation to camp per Cwt	Total cost delivered at camps per Cwt.
News print	$.50	$3.84	$2.75	$7.09
Glazed paper	.70	3.65	2.75	7.10

On checking areas in September that had been eradicated in June the glazed paper trail was easily followed, the paper looking like new. On other areas checked from one month to six weeks after eradication, where news print was used, great difficulty was had in finding pieces of paper.

NOTE: Sections quoted are taken from P. S. Simcoe's report to J. L. Bedwell, dated November 24, 1925.

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Table No. 11.

	Cost per Cwt.	Cutting per lot	Transportation to camps per Cwt.	Total cost delivered at camps per Cwt.
News print	1.50	2.84	$2.75	$7.09
Glazed paper	.70	3.65	2.75	7.10

On checking areas in September that had been eradicated in June the glazed paper trail was easily followed, the paper looking like new. In other areas checked from one month to six weeks after eradication, where news print was used, great difficulty was had in finding pieces of paper.

NOTE: Sections quoted are taken from [illegible] report to [illegible], dated November 24, 1925.

The conclusions are that although the cost delivered at camp is practically the same the glazed paper is better because:

1. Less paper is necessary.
2. It retains visibility longer.
3. It is visible for longer distances.
4. It shuffles easier so saves time of man laying trail.

There has been some argument as to the best manner of laying paper trail whether to hang paper on bushes, drop on the ground or a combination of both. Based on observations made during the last two field seasons, of men laying the trail and of the men following it, and on our experience when checking eradicated areas, there is a saving in time of the trail men when the paper is dropped on the ground under every condition encountered, even in dense brush. There is a noticeable lowering in efficiency of the strip covered by the trail men when paper is hung in brush.

II. Ribes tools: "The eradication work in native Ribes showed the necessity for some one or two practical tools for use in removing large plants, or plants growing under windfalls, in cracks of rocks, and in many similar places. Tools for this purpose must be strong, practical, easily carried, and must be safe for men to carry where the footing is poor.

Trials of the eighteen different tools sent out to us were made by the methods crew. One whole day was used in making these experiments, and each of the five men carried two or more tools. To make the trials as practical and fair as possible we had the work done in types where large bushes were to be encountered, and had the men trade the tools among themselves.

The trench pick, an instrument shaped like a mattock, but with a pick point in place of an axe blade, and with a handle about twenty inches long, proved to be very useful. One pick was carried by each foreman, and whenever a man found a plant which was too hard to pull he called for it. By the use of the mattock blade the men were able to get far enough below the crowns to cut the roots off without leaving danger of them sprouting again; then, after the crowns had been removed, it was not a difficult matter to take out the individual roots. Whenever bushes were found growing in cracks of rocks, or in between pieces of logs the pick point was of use in getting the crowns out. After experiments by the methods crew with different tools in places where the Ribes were solidly rooted had proved the greatest value of the trench tool, some tests were made to bear out our conclusions. Working in very similar conditions of Ribes growth we were able to get some fairly conclusive figures on the value of the

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trench pick by working without the pick for one day, and then using it on the next. We found that seven bushes required an average expenditure of seven minutes time each on the first day, while on the second day equally difficult bushes were eradicated by the help of the pick in an average time of forty seconds each. Another proof of the practicality of the pick was shown by the willingness of the crew foremen to carry, and to use this tool.

Another tool which proved to be fairly good was one which was shaped like a mattock, but with a narrow mattock blade opposite the wider blade. The tool was not heavy enough, and also the pick point was missed when needed.

Ribes hooks were not of much help in eradication. They were shaped like hay hooks; but with two hooks instead of one, and these were spread apart for two and one half to three inches at the hook end, forming an acute angle as they met at the handle. They were designed to be hooked under the crowns, and thus give firm hand-holds for the eradication men. It was so difficult, however, to get the tool hooked under the crowns, that no time nor labor could be saved.

Among the other tools which proved to be too light or too impractical were several botanist's picks, a Ribes hook with a long handle, a trench pick with too long a handle, and a trench pick with an opening about one half by two inches cut into the blade.

The most practical tool, making a saving in time and labor possible, was the short handled trench pick. The sharp pick point was a source of danger to the one carrying the tool, but this fault could be overcome by the use of some easily detachable sheath, which would still leave the blade ready for use. The twenty-inch handle was the length which allowed the greatest freedom in the brush, and yet left the tool very efficient."

Based on these experiments with the eighteen different styles of Ribes tools our conclusions were that, under different conditions encountered, the short handled army trench pick with some means of covering the sharp point is the best for our work in the woods of Upper Priest River.

III. Size and formation of crews:

Previous to this year eradication had been done by crews composed of five men working in line and one foreman following behind to keep the proper spacing and alignment and to check on the work done by the men. This year we decided to experiment on crews of different

trench pick by working without the pick for one day, and then using it on the next. We found that seven bushes required an average expenditure of seven minutes time each on the first day, while on the second day equally difficult bushes were eradicated by the help of the pick in an average time of forty seconds each. Another proof of the practicality of the pick was shown by the willingness of the crew foremen to carry, and to use this tool.

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size and formation to determine if under our western conditions some better method of work might be found for increasing the acreage per man day and at a similar or higher efficiency.

Areas were eradicated with sizes and formations as follows: five men in line and a foreman behind as used heretofore, five men in line with a foreman and one other man behind to help the foreman check, and six men in line with a foreman and one more man behind. "To get this information the same crew was used, except for necessary additions or subtractions, in similar conditions for three days, giving us a check on each method for one whole day for each area. The results, as follow; show the six-men-in-line-with-two-behind-formation to be the best:

Table No. X.

Formations	General Efficiency	Efficiency considering size of plant		No. Ribes pulled by crew	No. Ribes left per acre	Acreage	Acres per man day	Working Time
		Over 6"	Over 1'					
6 in line-2 behind	94.58%	95.47%	97.05%	1117	8.00	8.00	1.75	7 Hrs. 20 Min.
5 in line-2 behind	93.37%	95.39%	96.97%	352	4.27	5.87	1.31	7 Hrs. 10 Min.
5 in line-1 behind	87.40%	88.64%	92.40%	437	9.93	6.44	1.36	7 Hrs. 35 Min.

For some unaccountable reason the crew did very poor work the first two hours when the first formation was tried out; for that reason the percentages should be higher than they are. Prior to this time this formation was used and gave very favorable results.

At another time one crew was worked in the three formations for one hour each, and in uniform conditions, giving the following efficiency percentages respectively - 97.96 - 92.18 - 88.14."

The conclusions from the above experiments are that the crew composed of six men in line and two men behind is the best as it gives greater efficiency and more acres per man day.

IV. Up and down hill versus horizontal strip eradication: "Theoretically there are several reasons why crew work should cost less, and be more efficient when the lines or strips are run up and down the sides of valleys, than when they are along the contour.

The cost should be less for two reasons - (1) The time for the crew to reach each day's starting point from camp is much less. In an average sized block of country as laid out for eradication, the dimensions are usually about forty by forty chains. On any slope the time for a crew to reach a point only about half way to the top of the block, on a brushed-out trail, is more than that required to reach the furthermost part along the lower side. This represents a saving which should average around one half hour per day per crew. (2) The acreage should be increased, not due alone to the longer working day made possible by the saving in travel time to work, but doe to the possibility of having a wider interval between men. This wider interval is made possible by virtue of the fact that visibility to the sides and ahead is increased, and the men can move out to the edges of their intervals more easily. Furthermore, the men should be more willing to move out to the sides when they know that they do not have to climb up to a point looking for Ribes, or go down to the lower edges of their strips and then have to climb back again to get into position, as they must when working along the contour. This method of working up and down hill should gain more favor with the men when they realize that the duplication in climbing is done away with, and that even though they must go to the upper limits of the block before returning, their climbing is slow and not very tiring, with a compensating effect in the downward strip.

The chief arguments against this method were that it would be impossible to get good work from crews working down hill, and that the interval would be difficult to maintain. The grounds for the contention that the work would be very poor on the return or downhill strips were that the visibility is very low for any one looking for Ribes which might be growing downhill from him, and hidden by other vegetation. This is very true, and means that crew men in this type of work would have to cultivate the habit of looking backward every few feet. When working along the contour the men tire along in the afternoons to such an extent that they will not go down to the lower parts of their intervals to get a chance to look back up under the screens of vegetation. At this time they can not depend on the men next below them in line to come up far enough to help them out. The interval should be easier to keep since an individual is more apt to deviate from walking in a straight line along the contour than when traveling up and down hill at right angles to it.

To prove the value of the method of working up and down hill some figures were found from comparisons of work done by both methods. The experiments were on too small a scale to be conclusive,

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To prove the value of the method of working up and down hill some figures were found from comparisons of work done in both methods. The experiments were on too small a scale to be conclusive.

but I believe that in country typical of Upper Priest River, the method is far better than that of working along the contour. The following figures are based on the findings for one day's work on each method with the same crew. The first method used in comparison has been discussed before, and should have been higher in efficiency as explained."

Table No. XI.

Formation and Method	General Efficiency	Efficiency Considering size of plants		No. Pull-by Crew	No. Left per Acre	Acreage	Acres per man Day	Working Time
		Over 6" L.S.	Over 1' L.S.					
6 in line 2 behind up and down hill	94.58%	95.47%	97.05%	1117	8.00	8.00	1.75	7 Hr.20Min.
6 in line 2 behind along contour	94.54%	95.72%	96.99%	1159	18.33	3.60	.72	6 Hr.40Min.

These results justify the conclusion that under the two methods the efficiency is about equal but that much more work is done per day by the first method.

V. Relation of speed and interval to efficiency: "Along with the studies of methods we worked experiments to show the effects of detrimental practices in crew work, and trials were made to determine which lowered the general efficiency most. The first information wanted was on the question of whether too much speed or too wide an interval caused the greater fall in efficiency percentages. To find an answer we worked crews at high speed with normal interval and at wide intervals with normal speed, and compared the results. The figures, as follow, show that the former practice hurt the work more."

Too much speed	66.50% Efficiency
Too much interval	88.58% Efficiency

We do not consider the results of this work to be sufficiently detailed to justify any positive conclusions. Future studies along this line will probably show that there are degrees of both speed and interval within which good efficiency can be maintained and beyond which it cannot. The efficiency of work done in both parts of this experiment is too low to be considered permissable.

VI. Relation of attention to efficiency: "The next thing was to find out what effect diverted attention to work might have. It had been noticed by men checking on the Oregon work, and also by the checking crew on Upper Priest River in Idaho that there were places where Ribes seemed to be generally missed by the whole crew at one time. Since these places seemed always to be in types where there was nothing to seriously hinder the men, we decided that the attention of the whole crew had been taken from the work for a short time.

In order to get reliable figures on this fault we had a first class foreman work a good crew for a time with everyone doing his best, and then had this foreman start arguments with different members of the crew concerning topics not related to the work. A checking crew covered the two equal and similar areas getting the following information."

Concentrated Attention	94.49% Efficiency
Diverted Attention	81.82% Efficiency

This experiment shows that we were probably right in our previous suspicion that one reason for bushes being missed by several members of the crew at one place was that their attention was diverted at that point. This lapse in attention was probably due to an argument or general discussion occurring at that particular time.

VII. Difficulty factors of eradication: In analyzing the costs and efficiency of eradication done during the last two seasons it was noticed that areas having the same type designations and a comparable number of Ribes per acre showed a marked difference in cost of eradication and efficiency. Part of this difference might be attributed to differences in men and foremen but not all. Some studies were conducted this season to determine what other factors, if any, effected this difference in costs and efficiency.

We do not consider the results of this work to be sufficiently detailed to justify any positive conclusions. Future studies along this line will probably show that there are degrees of both speed and interval within which good efficiency can be maintained and beyond which it cannot. The efficiency of work done in both parts of this experiment is too low to be considered permissable.

VI. Relation of attention to efficiency: "The next thing was to find out what effect diverted attention to work might have. It had been noticed [illegible] checking on the [illegible], and also by the [illegible] crew on Upper Priest River in Idaho that there were places where [illegible]. Since these places seemed always to be in [illegible] where there was nothing to seriously hinder the men, we decided that the attention of the whole crew had been taken from the work for a short time.

In order to get reliable figures on this fault we had a first class foreman work a good crew for a time with everyone doing his best, and then had this foreman start arguments with different members of the crew concerning topics not related to the work. A checking crew covered the two equal and similar areas getting the following information.

Concentrated attention	[illegible]
Diverted attention	[illegible]

This experiment shows that we were probably right in our previous suspicion that one reason for bushes being missed by several members of the crew at one place was that their attention was diverted at that point. This lapse in attention was probably due to an argument or general discussion occurring at that particular time.

[illegible] of eradication: [illegible] of eradication [illegible] noticed that areas having the same type designations and a comparable number of Ribes per acre showed a marked difference in cost of eradication and efficiency. Part of this difference might be attributed to differences in men and foremen but not all. Some studies were conducted this season to determine what other factors, if any, effected this difference in costs and efficiency.

Some experiments were outlined to see if the time spent covering the area, searching for Ribes, pulling Ribes, and hanging the bushes could be separated from the time required in just traveling over the area. Crews were timed while walking in crew formation thru the type to be worked to get their approximate rate of travel. The crew then did one day's eradication and the area limits were carefully marked. The following day the crew covered this same area, in crew formation just traveling over the ground not searching for, pulling or hanging bushes. All time was taken out for drinking, resting, etc. It was thought that this time necessary to cover the ground would give an indication of the difficulty of working.

This experiment was completed for six crews but the second part of the experiment was prevented by the camps being closed down so the men could go to fight forest fires.

The following table gives the results of the experiment:

Table No. XII.

Unit 1.

Foreman	Time to reach work	Time searching, pulling & travelling	Time travelling only	No. of Ribes pulled	Acres worked	Type	No. of crewmen
Sokolnikoff	41 min.	7 hrs, 25 min.	1 hr. 14 min.	468	5.8	3-4	5
Walters	40 min.	6 hrs. 55 min.	1 hr. 3 min.	558	5.5	3-4	5
Brown	35 min.	6 hrs. 37 min	1 hr. 47 min.	1075	4.5	*3-4	5
Henneberg	1 hr.	6 hrs. 6 min.	1 hr. 8 min.	875	10.0	3-4	6
Average	46½ min	6 hrs. 37 min.	1 hr. 25min.	744	6.45		

*Windfalls

Unit 2.

Foreman	Time to reach work	Time searching pulling and travelling	Time travelling only	No. of Ribes pulled	Acres worked	Type	No. of crew-men
Eldridge	28 min.	6 hrs. 53 min.	37 min.	2662	3.7	1 & 3	5
Erickson	15 min.	7 hrs. 9 min.	2 hrs. 29 min.	1395	9.5	3	6
Swanson	39 min.	7 hrs. 7 min.	Fire fighting	1296	5.0	3	6
Johnston	40 min.	7 hrs. 8 min.	Fire fighting	2914	3.0	1 & 5	6
Average	30½min.	7 hrs. 42 min.	1 hr. 33 min.	2067	5.25		

The areas showing the highest travel time in both camps were the areas hardest to work from the standpoint of impediments to travel, as windfalls, rock slides, dense brush, etc. The small acreage of Eldridge's block in Unit 2, which consisted of only 3.7 acres, was not due to any travel difficulty but was due entirely to concentration of small sized Ribes bushes.

No conclusive results can be shown by this experiment but we feel that it does give some indication of the differences in difficulty in working areas of the same type.

More work along this line should be done next season. To give some indication of the differences in difficulty of eradication we have decided to take data on each block eradicated according to the following plan:

$$\text{Percent of slope} = \frac{\%}{4}$$

$$\text{Density of brush} = \frac{\%}{4}$$

$$\text{Density of Windfalls} = \frac{\%}{4}$$

$$\text{Density of Rock cover} = \frac{\%}{4}$$

Total =

Dividing each percent by four reduces the total to the basis of a possible 100%. This total, if no consideration is given to the effect of the number of Ribes per acre or on the time necessary to work an area, should be an indication of the difficulty of work on a given area. An area having a high total would be more difficult than one having a low total. If two areas of the same type designation have approximately the same total but one requires more time to eradicate per acre and it has higher number of Ribes per acre this scheme might give an indication of the effect of number of Ribes per acre on the time required to eradicate, providing of course that both areas are by the same crews or crews of equal ability.

NOTE: This experiment was suggested by Mr. A. E. Fivaz' paper, "Crew Eradication of Ribes", of May 2, 1925.

VIII. Relation of time of day to efficiency of eradication: Some checks were made during the season to find what relation, if any, the time of day had to efficiency. In all of these checks but one a much higher efficiency was observed in the forenoon than in the afternoon.

Table No. XIII.

	Forenoon	Afternoon
	84.80%	92.00%
	88.41%	66.67%
	93.24%	87.46%
	87.13%	80.22%
	97.01%	84.19%
Average	90.11%	84.19%

The last hour in the forenoon and the first and last hours in the afternoon showed the lowest efficiencies. The foremen should be cautioned, therefore, to be especially alert at these times and be more exacting of their crews in order to obtain a good average efficiency for the day's work.

IX. Distance from camps to work and resulting loss in time and efficiency. This season areas were worked which were contiguous to the camps while other areas were worked at distances up to 2½ miles from camp to the point of beginning work.

Table No. XIV.
Unit No. 1.

Crew foreman	Crew man minutes from camp to work	Crew man minutes on actual work	Percent of paid time spent in walking to work	Percentage efficiency all bushes	Difficulty of working	Amount paid for this day for walking from camp to work: Crew men only	Amount paid for this day for walking from camp to work: Men and foremen
Brown	175	1985	8.10	92.99	Hard	$2.66	$3.23
Henneberg*	360	2196	14.08	82.97	Medium	5.55	6.55
Sokolnikoff	205	2225	8.43	92.31	Medium	2.77	3.37
Walters	200	2075	8.79	87.88	Medium	2.89	3.51
Totals and Averages	940	8481	9.97	88.75		13.87	16.66

Unit No. 2

Crew Foreman	Crew man minutes from camp to work	Crew man minutes on actual work	Percent of paid time spent in walking to work	percentage efficiency all bushes	Difficulty of working	Amount paid for this day for walking from camp to work: Crew men only	Amount paid for this day for walking from camp to work: Men and foremen
Eldridge	140	2065	6.34	94.75	Medium	$1.92	$2.34
Erickson*	90	2574	3.37	91.99	Medium	1.22	1.44
Johnston*	240	2568	8.54	72.35	Medium	3.10	3.66
Swanson*	234	2562	8.36	88.12	Medium	3.03	3.58
Totals and Averages	704	9769	6.72	88.77		9.27	11.02

*These crews consisted of six men and a foreman instead of five men and a foreman as in the case of the others.

The above tables show the results of one day's record kept on each crew near the middle of the season (July 23). The time listed under time of actual work is net working time with all lost time such as drinking, resting, etc., deducted. It is interesting to observe for Unit #2, that in all cases but one the efficiency is inversely proportional to the percentage of time required to get to work from camps and that of Unit #1 it is inversely proportional in every case. This bears out our observations on the season's checking that walking crews very far to work tends to lower their efficiency. In addition it can be seen from this table that there is considerable lossin cost efficiency when crews have to walk very far. Another important consideration which is not shown on this table is the time required to return to camp in the evening after work which in most cases will approximate that required to go from camp to work. This travel is done on the individual's time and, if it is excessive, it increases the fatigue and lowers the morale proportionately.

It should be stated, in way of explanation, that in some few cases it is impossible to have camps as close to work as would be desirable but in other cases one half day's time spent by the crew in packing supplies and bedding to a fly camp would show a considerable gain in efficiency of work and costs.

Summary and Conclusions.

A. Checking.

1. Checking is the best means of detecting poor methods of work and of conceiving new methods.

2. Impartial and efficient checking can be done better by an organization which is separate and independent of the eradication project.

3. Not less than two percent of an area should be checked after eradication if average conditions are to be encountered in western white pine areas.

4. A record of the sites where Ribes are most commonly missed by crews should be of value to crew foremen in drawing their attention to such places while eradicating.

5. In checking missed bushes it was found that 28.4% of all bushes missed were lower than the surrounding brush.

6. In going from one eradication type to another there is a marked increase in number of bushes missed for a short distance in the new type. This can be avoided by foremen cautioning the crews at time of changing types.

7. Checking covered 11,970.6 acres at a cost of 11 cents an acre.

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B. Methods.

1. Glazed trail paper is easier to lay, easier to follow, is visible for a longer time and for a greater distance, and costs no more than ordinary news print paper.

2. Paper dropped on the ground is quicker to lay and easier to follow than when hung on bushes, and the trail man does not miss so many bushes when paper is dropped.

3. Under conditions encountered in the areas eradicated in north Idaho the short handled army trench pick is the best tool for the eradication of wild Ribes.

4. The best size and formation for crews on eradication in north Idaho was found to be one with six crewmen working in line with the foreman and one other man checking behind.

5. In mountainous country, such as the Upper Priest River Valley, more acreage can be eradicated with the same efficiency by strips run up and down hill than by strips run along the contour.

6. Concentrations of missed Ribes on a crew strip is often caused by a lapse in attention.

7. Difficulty factors of eradication are not confined to number of Ribes alone. Other factors found to influence the time and cost of eradication are degree of slope, rock slides, cliffs, windfall, density of brush and reproduction. More intensive study of these factors and their relation to cost should be included in plans for future work.

8. The last hours work in the forenoon and the first and last hours' work in the afternoon were found to give the lowest efficiency.

9. It was observed that efficiency of work is inversely proportional to the distance of camps from point of beginning work.

Supplement to Checking Report
by
J. L. Bedwell, Assistant Pathologist

Certain data had not been compiled at the time the regular report was typed so it is being submitted as a supplement to that report.

Efficiency of Eradication on Feet of Live Stem Basis

Table No. I, in the main Checking Report, shows the efficiency of eradication by height classes of Ribes bushes. The following table No. 1 shows the efficiency of the same blocks on the basis of feet of live stem left per acre and a comparison of the efficiency on this basis with the efficiency on the basis of the number of bushes missed.

Table No. I.
Efficiency of Eradication by Live Stem Classes

UNIT No. 1.

Block	Acres in Block	No. of Bushes Pulled per Acre			Feet of Live Stem Pulled per Acre			No. of Bushes Missed per Acre All Sizes			Feet of Live Stem Missed per Acre			% Efficiency of Eradication by No. of Bushes			% Efficiency of Eradication by Live Stem		
		lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total
1	39.0	68.2	242.1	310.3	990.9	2711.5	3702.4	.7	57.0	57.7	3.8	120.5	124.3	89.99	80.95	84.33	98.51	95.75	96.75
2	315.0	41.7	63.8	105.5	604.7	714.6	1319.3	3.3	.4	3.7	26.1	7.0	33.1	92.67	99.38	96.62	95.86	99.30	97.55
3	195.0	29.7	1.9	31.6	430.7	21.3	452.0	2.6	0.0	2.6	4.6	0.0	4.6	91.95	100.00	92.40	98.48	100.00	98.99
4	220.0	59.9	3.6	63.5	868.6	39.9	908.5	28.7	6.3	35.0	163.3	6.6	169.9	67.61	36.37	64.47	84.17	85.81	84.25
5	252.5	4.7	1.6	6.3	68.2	17.9	86.1	0.0	.6	.6	0.0	6.6	6.6	100.00	72.73	91.31	100.00	73.06	92.88
6	275.0	6.8	2.3	9.1	98.6	25.8	124.4	0.0	.2	.2	0.0	1.2	1.2	100.00	92.00	97.85	100.00	95.55	99.04
7	132.0	20.9	207.9	228.8	303.1	2440.5	2743.6	3.6	35.8	39.4	20.6	148.8	169.4	85.31	85.31	85.31	93.63	94.26	94.19
8	4.0	590.0	1.5	591.5	8555.0	16.8	8571.8	8.3	0.0	8.3	21.6	0.0	21.6	98.62	100.00	98.62	99.75	100.00	99.75
9	276.0	56.3	.4	56.7	816.4	4.5	820.9	37.6	.2	37.8	148.2	1.5	149.7	59.96	66.67	60.00	84.64	75.00	84.58
Totals & Averages	1708.5	34.3	34.5	68.8	497.4	386.4	883.8	11.26	5.17	16.43	43.4	16.8	60.2	75.22	86.91	80.76	91.98	95.84	93.63

UNIT No. 2.

Block	Acres in Block	No. of Bushes Pulled per Acre			Feet of Live Stem Pulled per Acre			No. of Bushes Missed per acre All Sizes			Feet of Live Stem Missed per Acre			% Efficiency of Eradication by No. of Bushes			% Efficiency of Eradication by Live Stem		
		lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total
1	166.2	1.4	43.5	44.9	20.3	487.2	507.5	.8	14.8	15.6	24.5	95.8	120.3	63.64	74.62	74.22	45.30	83.57	80.84
2	183.8	40.9	69.4	110.3	593.1	777.3	1370.4	7.2	17.5	24.7	26.0	72.1	98.1	85.04	79.89	81.71	95.81	91.52	93.33
3	306.4	70.4	40.9	111.3	1020.8	458.1	1478.9	14.4	.8	15.2	54.5	3.7	58.2	83.02	98.09	87.99	94.94	99.20	96.21
4	290.8	10.1	3.7	13.8	146.5	41.4	187.9	2.2	.8	3.0	11.1	5.2	16.3	82.12	82.23	82.15	92.96	88.85	92.02
5	274.2	37.6	128.3	165.9	545.2	1437.0	1982.2	2.7	20.0	22.7	9.3	36.7	46.0	93.31	86.52	87.97	98.33	97.51	97.74
7	301.2	27.2	52.1	79.3	394.4	583.5	977.9	2.4	14.4	16.8	9.4	44.5	53.9	91.90	78.35	82.52	97.68	92.92	94.78
8	194.2	5.0	73.0	78.0	72.5	817.6	890.1	1.4	9.0	10.4	6.0	3.3	9.3	78.13	88.03	88.24	92.36	99.60	98.97
9	152.7	26.4	77.9	104.3	382.8	872.7	1255.5	2.4	26.9	29.3	25.8	107.0	132.8	91.67	74.34	77.98	93.69	89.08	90.44
11	257.7	108.0	62.1	170.1	1566.0	695.5	2261.5	9.9	7.4	17.3	94.1	58.9	153.0	91.61	89.36	90.77	94.34	92.20	93.67
12	255.9	80.4	5.9	86.3	1165.8	65.1	1230.9	7.7	3.5	11.2	35.1	37.1	72.2	91.26	62.88	88.51	97.09	63.70	94.46
Totals & Averages	2383.1	43.7	53.7	97.4	633.7	601.4	1235.1	5.6	10.3	15.9	31.5	40.7	72.2	88.65	83.91	85.97	95.27	93.67	94.48

Units 1 and 2 Combined

Unit	Acres Covered	No. of Bushes Pulled per acre			Feet of Live Stem Pulled per Acre			No. of Bushes Missed per Acre All Sizes			Feet of Live Stem Missed per Acre			% Efficiency of Eradication by No. of Bushes			% Efficiency of Eradication by Live Stem		
		lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total	lac.	vis.	Total
No. 1	1708.5	34.3	34.5	68.8	497.4	386.4	883.8	11.26	5.17	16.43	43.4	16.8	60.2	75.22	86.91	80.76	91.98	95.84	93.63
No. 2	2383.1	43.7	53.7	97.4	633.7	601.4	1235.1	5.60	10.30	15.90	31.5	40.7	72.2	88.65	83.91	85.97	95.27	93.67	94.48
Totals & Averages	4091.6	39.8	45.9	85.7	576.8	511.3	1088.4	7.59	8.79	16.38	35.8	32.3	68.0	83.57	83.93	83.96	94.16	94.06	94.12

In Table No 1 the data showing number of feet of live stem missed per acre was obtained directly from the checking field sheets on which feet of live stem for every bush checked is recorded by species.

To get at the approximate number of feet of live stem of each species that had been eradicated on each block required more data than was obtainable from eradication or checking records.

The area which has been eradicated on Upper Priest River had been covered before eradication by intensive reconnaissance consisting of strips run at right angles and other strips run parallel to the drainage. In running these strips the number of Ribes and the feet of live stem was recorded by species.

Inaddition to the reconnaissance on this locality the ecology project has plots interspersed over the area on the various types. They had recorded the number of bushes and feet of live stem by species.

From this combined reconnaissance and ecology data the average number of feet of live stem for each species was computed.

As the ecology data were based on more careful measurements they were used as a basis to apply to the reconnaissance data, the latter being used to get the size of the average bush because of the larger number of bushes included. The following table shows the ecology data used:

Table No. 2.

Ribes Bushes by Live Stem Classes
(from ecology field notes)

	1'		10'		50'		Over 50'		Total
	No. bu.	Ave. ft. l. s.	No. bu.	Ave. ft. l. s.	No. bu.	Ave. ft. l. s.	No. bu.	Ave. ft. l. s.	No. bu.
R. lacustre	73	.5	541	5.1	161	19.2	5	62	775
R. viscossimum	27	.5	247	4.7	110	19.9	1	56	385

In compiling this table the actual feet of live stem was recorded under the proper group headings of one foot, ten feet, fifty feet and over fifty feet. The total feet of live stem in each group was obtained and divided by the number of bushes in that group giving an average for feet of live stem for that group. This completed table then shows the number of bushes by species used in each group and the average number of feet of live stem for bushes falling within that group.

This average bush for each group was then applied to the reconnaissance data (Table No. 3) so as to get an average based on a large number of bushes. This was done by multiplying the average feet of live stem for each particular group by the number of bushes. These totals for feet of live stem in each group were added and divided by the total number of bushes, which gave an average number of feet of live stem per bush for each species.

Table No. 3.

Average Live Stem per Bush by Live Stem Classes
(Based on 1923 and 1924 reconnaissance of Upper Priest River)

	Bushes by Live Stem Classes												All classes		
	1'			10'			50'			Over 50'					
	No. bu.	Ave. ft. l. s.	Tot. ft. l. s.	No. bu.	Ave. ft. l. s.	Tot. ft. l. s.	No. bu.	Ave. ft. l. s.	Tot. ft. l. s.	No. bu.	Ave. ft. l. s.	Tot. Ft. l. s.	Total No. bu.	Tot. ft. l. s.	Ave. ft. l. s. per. bu.
R. lacustre	279	.5	139.5	717	5.1	3656.7	650	19.2	12480.0	190	62	11780.0	1936	28106.2	14.5
R. viscos- isimum	231	.5	115.5	755	4.7	3548.5	408	19.9	8119.2	87	56	4872.0	1481	16655.2	11.2
Totals & Averages	610	.5	305.0	1472	4.9	7205.2	1058	19.5	20599.2	277	60.1	16652.0	3417	44761.4	13.1

Using this average number of feet of live stem as a standard the number of bushes pulled on each block was multiplied by this average to get the approximate feet of live stem pulled.

As shown by Table No. 1, the efficiencies of eradication on the basis of number of bushes shows quite a marked difference between the two units in favor of Unit No. 2. On the basis of live stem misted per acre, however, there is very little difference between the two.

Supplement to Methods Report
by
J. L. Bedwell, Assistant Pathologist

Analysis of man day work efficiency on 1924 and 1925 eradication:

The data in the table below is an attempt to analyze the results of the eradication work done in 1924 and 1925 to see if there has been any increase in acres worked or Ribes pulled per man day on the same types. This analysis does not consider costs of working as such, but is based merely on the results accomplished per man day.

By way of explanation it should be stated that the 1925 figures include work done during the entire season including training period and considerable lost motion and slowing up due to fatigue caused by fire fighting. This fire fighting occurred during that part of the season (July and August) when the conditions are best from the standpoint of training and physical fitness of the men and the favorable weather. The 1924 figures included, on the other hand, the working period only, (July 27 to September 20), without any training period, fire fighting, or rainy weather.

Supplement to Methods Report
by
J. L. Bedwell, Assistant Pathologist

Analysis of man day work efficiency on [illegible]:

The data in the table below is an attempt to analyze the results of the eradication work done in 1924 and 1925 to see if there has been any increase in acres worked or Ribes pulled per man day on the same types. This analysis does not consider costs of working as such, but is based merely on the results accomplished per man day.

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Table No. 1.
Results per Man Day on Eradication,
1925.*

Type	Ribes per Acre			Acres	Man Days				Acres per Man Day	Ribes per Man Day	% Efficiency of Bushes Over 1 Ft.
	lacustre	visco-sissimum	Total		Scouts	Foremen	Laborers	Total			
1	294.0	33.1	327.1	123.90	4.85	28.10	145.20	178.15	.64	227.49	
2	1.5	.7	2.2	712.60	11.40	10.44	57.12	78.96	9.02	19.89	
2 (b)	64.2	557.2	621.4	18.40	1.62	3.62	15.65	20.89	.88	547.48	
3	41.2	95.9	137.1	698.45	11.37	95.78	511.83	619.48	1.12	148.92	
4	27.6	88.7	116.3	325.65	8.25	37.17	186.25	231.67	1.40	163.47	
5	40.1	18.5	58.6	490.40	2.50	34.06	181.35	217.91	2.25	131.87	
6	206.1	314.8	520.9	44.70	3.20	11.17	55.30	69.67	.64	334.20	
7	56.3	1.6	57.9	30.80	.75	2.10	11.62	14.47	2.12	133.24	
Totals & Averages	43.4	54.3	97.7	2444.90	44.44	222.44	1164.32	1431.20	1.70	168.30	94.02

*This table is the data from Unit No. 2 used for same reasons as given in report on Ribes eradication for 1925

1924

Type	Ribes per Acre			Acres	Man Days				Acres per Man Day	Ribes per Man Day	% Efficiency of Bushes over 1 ft.
	lacustre	visco-sissimum	Total		Scouts	Foremen	Laborers	Total			
1	183.2	6.8	190.0	255.9	39.0	39.9	199.4	278.3	.91	174.72	
2 + 2(b)	8.6	4.0	12.6	2953.4	70.0	51.6	257.9	379.5	7.78	99.48	
3	54.7	36.4	91.1	1732.4	68.2	100.7	503.7	672.6	2.57	236.58	
4	20.5	14.2	34.7	254.0	5.0	10.1	50.6	65.7	3.86	134.39	
5	9.4	9.6	19.0	309.3	9.0	11.6	57.9	78.5	3.94	75.45	
6	586.4	0.0	586.4	12.0	1.0	4.5	21.5	27.0	.44	260.63	
Totals & Averages	33.2	15.1	48.3	5517.0	192.2	218.4	1091.0	1501.6	3.67	178.00	88.12

This table shows that in 1925 there were more acres worked and more bushes pulled per man day on types 6 and on types 2 and 2 (b) than on the same types in 1924. (In comparing types 2 and 2 (b) for the two years the 1925 types 2 and 2 (b) must be combined in order to have them on the same basis as on the 1924 table.)

There were also more bushes pulled per man day in 1925 than in 1924 on types 1, 4 and 5.

The general efficiency of the 1925 eradication was 94.02% compared to 88.12% for the 1924 work on the same basis.

This method of analysis can be applied to future work in any locality and then can be reduced to a cost basis by applying the cost of the composite man day which is variable in different localities and in different seasons depending upon transportation problems, scales of wages, costs of provisions, etc.

Another advantage of this method of analysis is that it shows us on which types we need to show the most progress in man day work efficiency. One of the best means for increasing the man day efficiency will probably be for camp bosses to hold to a minimum such things as time of travel from camps to work, time moving camps, time lost on line due to excessive nooning, excessive resting, poor paper trail, time in turning crew at end of strips, camp detail and other non-effective activities.

CONTROL RECONNAISSANCE ON FEDERAL LANDS, IDAHO
JUNE 15, TO SEPTEMBER 15, 1925

H. N. Putnam, Assistant Pathologist

I. Purpose.

Control reconnaissance as performed this past season on Federal lands, had for its purpose the accomplishment of two things: (1) to make intensive studies of Ribes in as many different timber age classes and densities as possible in a white pine region: and (2) to divide a given region into areas showing sililar working conditions by determining the limits of each area.

II. Locations of Work

Santa, Idaho, was chosen as an area in which to train men in reconnaissance purposes and methods.

This area lies in T. 44 N., R. 1 W., Boise Meridian. The topography consists of low lying hills ranging in altitude from 2300 to 4000 cut by the St. Maries River flowing diagonally through the township from the southeast; by numerous tributaries flowing southwest, such as Old Soldier Creek, Beaver Creek, Train Creek, Renefro Creek; and by tributaries flowing north east such as Tyson Creek, Sheep Creek, Santa Creek.

Reasons governing the choice of this area as a training ground are discussed under the following headings: (1) accessibility: (2) forest types found: (3) timber age classes present: (4) Ribes conditions.

Accessibility:

Santa, a town of about 100 inhabitants lies near the center of the township. It is within walking distance of good sections to study. Good subsistence was obtained at a hotel at the rate of $1.50 per day. Santa is approximately 100 miles southeast of Spokane, and is connected with it by the Union Pacific Railroad and the Spokane, Fernwood Auto Stage. Santa can be reached in a half day's time from Spokane.

Forest types found:

A good white pine region surrounds Santa. The influence of exposure on the composition of the stand in this region is well marked. The white pine stands, consisting of white pine, white fir, larch, hemlock, cedar, occupy the north and east slopes and the cool narrow draws. The south and west exposures are covered with a Douglas fir, white fir, larch, association, occasionally mixed with yellow-pine. On dry, exposed south and west slopes, yellow-pine predominates.

Timber age classes:

A large part of the mature white pine stands were cut over in 1912 to 1920. Smaller areas of age classes 0 to 20; 20-40; 40-60 years were found, and sufficient areas of 100 to 200 year old white pine.

Ribes conditions:

Four species of Ribes, namely, Ribes periolare, R. lacustre, Grossularia inermis and R. viscosissimum were found on the area. The first three species were found associated along streams. R. petiolare was restricted to the portion of stream situations where the soil was deep. R. viscosissimum occurred in drier situations, principally on cut over areas.

Coeur d'Alene National Forest

The region chosen for reconnaissance on the Coeur d'Alene National Forest lies in the drainage of the Little North Fork of the Coeur d'Alene River, Idaho. Nearly all of the Honeysuckle Ranger District was reconnaissanced, except that portion of it drained by the lower Little North Fork River. The area reconnaissanced lies in all or in part of the following townships:

Township	50 N.	Range	1 W.	- Boise Meridian		
"	51 N.	"	1 E.	"	"	
"	51 N.	"	1 W.	"	"	
"	51 N.	"	2 W.	"	"	
"	52 N.	"	1 W.	"	"	
"	52 N.	"	2 W.	"	"	
"	53 N.	"	1 W.	"	"	
"	53 N.	"	2 W.	"	"	

This area comprises the upper drainage system of the Little North Fork River from its source near Chilco Mt., southeast to a point near Lieberg. This river and its tributaries have many narrow canyons forming low hills with steep slopes. Hillsides having grades ranging from 75 to 100 per cent are not uncommon. Altitudes vary from 2000 feet at Lieberg to 5500 feet at Chilco Mountain.

Accessibility: The area is reached by an auto road from Coeur d'Alene, Idaho to Honeysuckle Ranger Station, located in Sec. 28, T. 51 N. R. 1 W., at the junction of Spokane Creek and Little North Fork River, a distance of 29 miles. A rough road passable to autos extends from Honeysuckle 6 miles down the river to Lieberg, and 6 miles further up Lieberg Creek. These constitute the total number of wagon roads in this area.

It is possible to reach the western portion of the area by

Timber age classes:

A large part of the mature white pine stands were cut over in [illegible] to [illegible]. [illegible] were found, and sufficient areas of 100 to 200 year old white pine.

Ribes conditions:

Four species of Ribes, namely, *Ribes petiolare*, *R. lacustre*, *Grossularia inermis* and *R. viscosissimum* were found on the area. The [illegible] *R. viscosissimum* occurred in drier situations, principally on [illegible]

Coeur d'Alene National Forest

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Township 50 N.	Range 1 W.	-	Boise Meridian	
" 51 N.	" 1 E.		"	"
" 51 N.	" 1 W.		"	"
" 51 N.	" 2 W.		"	"
" 52 N.	" 1 W.		"	"
" 52 N.	" 2 W.		"	"
" 53 N.	" 1 W.		"	"
" 53 N.	" 2 W.		"	"

This area comprises the upper drainage system of the Little North Fork River from its source near Chilco Mt., southeast to a point near Lieberg. This river and its tributaries have many narrow canyons [illegible] with steep slopes. [illegible] from 70 to [illegible] per cent are not uncommon. [illegible] at Lieberg to 5300 feet at Chilco Mountain.

Accessibility: The area is reached by an auto road from [illegible], Idaho to Honeysuckle Ranger Station, located in Sec. [illegible], T. 51 N. R. 1 W., at the junction of Spokane Creek and Little North Fork River, a distance of 29 miles. A rough road passable to autos extends from Honeysuckle 5 miles down the river to Lieberg, and 6 miles further up Lieberg Creek. These constitute the total number of wagon roads in this area.

It is possible to reach the western portion of the area by

means of the Ohio Match Company railroad running from Belmont, Idaho, to the Ohio Match Company Camp 23 in Burnt Cabin Creek, Sec. 13, T. 51 N. R. 2 W.

The four lookout stations, Monument Mountain, Lookout Ridge, Spades Mountain, and South Chilco Mountain; and the three smoke chaser stations, Lieberg, Honeysuckle, and Horseheaven are connected by good horsetrails: there are fair fire trails up the principal tributaries.

Reasons governing the choice of this area to be reconnaissanced are discussed under the following headings: (1) forest types found; (2) age classes represented: (3) timber sale areas, and (4) Ribes conditions.

Forest types found:

White pine type occupies the greatest acreage in this region. It is chiefly confined to north and east exposures, narrow draws, and lower cool southwest slopes. The principal species in mixture in the white pine type are white pine, white fir, l rch, and hemlock. In the young age classes lodgepole pine is also often found. On south and west exposures is found the larch, Douglas fir, white fir type. Spruce, alpine fir type occurs in the braoder portions of the river valley, notably at Horseheaven. There are small areas of subalpine type on elevations above 5000 feet, in which the stand consists of spruce, alpine fir, and occasional scrubby Douglas fir.

Age classes represented: All timber age classes in the white pine type up to 200 plus years are found, 0 to 10 years, 10 to 20, 20 to 40, 40 to 60, 60 to 80, 80 to 100, and 100 to 200.

Timber sale areas:

Numerous timber sales have been made in this region from 1912 to the present date, under the following cutting plans: clear cutting, clear cutting with selected seed trees left singly, clear cutting with seed trees left in strips, weed trees girdled. Horse logging is done in this region. The logs are skidded to the log chute by horses; drawn down the greased chute by horses; dumped into the log water flume, down which they float to the river. Then by means of splash dams on the river they are driven down stream. The Ohio Match Company take their logs out by railroad.

Ribes conditions:

Three species are found as follows: Ribes viscosissimum, R. lacustre, and Grossularia inermis. The last species is confined to moist locations, where it occurs often in dense patches. R. lacustre is quite generally distributed over the area in openings, reaching its greatest concentration numerically and its largest growth in moist, open situations. R. viscosissimum is confined to the drier open situations.

means of the Ohio Match Company railroad running from Belmont, Idaho, to the Ohio Match Company Camp 26 in Burnt Cabin Creek, Sec. 17, T. 51 N. R. 2 W.

The fire lookouts [illegible], [illegible], [illegible], Spades Mountain, and South Chilco Mountain; and the three smoke chaser stations, Lieberg, Honeysuckle, and Horseheaven are connected by good horsetrails: there are fair fire trails up the principal tributaries.

Reasons governing the choice of this area to be reconnaissanced are [illegible]: (1) [illegible] types found; (2) age classes represented; (3) timber sale areas, and (4) Ribes conditions.

<u>Forest types found:</u>
White pine type occupies the greatest acreage in this region. It is chiefly confined to north and east exposures, narrow draws, and lower cool southwest slopes. The principal species in mixture in the white pine type are white pine, white fir, larch, and hemlock. In the young age classes lodgepole pine is also often found. On south and west exposures is found the larch, Douglas fir, white fir type. Spruce, alpine fir type occurs in the broader portions of the river valley, notably at Horseheaven. There are small areas of subalpine type on elevations above 5000 feet, in which the stand consists of spruce, alpine fir, and occasional stands of Douglas fir.

<u>Age classes represented:</u> All timber age classes in the white pine type up to 200 plus years are found, 0 to 10 years, 10 to 20, 20 to 40, 40 to 60, 60 to 80, 80 to 100, and 100 to 200.

<u>Timber sale areas:</u>
Numerous timber sales have been made in this region from 1912 to the present date, under the following cutting plans: clear cutting, clear cutting with selected seed trees left singly, clear cutting with seed trees left [illegible], seed trees girdled. Flume logging is done in this region. The logs are skidded to the log chute by horses; drawn down the [illegible] and flumed into the [illegible], down which they float to the river. Then by means of splash dams on the river they are driven down stream. The Ohio Match Company take their logs out by railroad.

<u>Ribes conditions:</u>
Three species are found as follows: <u>Ribes viscosissimum</u>, <u>R. lacustre</u>, and <u>Grossularia inermis</u>. The last species is confined to moist locations, where it occurs often in dense patches. <u>R. lacustre</u> is quite generally distributed over the area in openings, reaching its greatest concentration numerically and its largest growth in moist, open situations. <u>R. viscosissimum</u> is confined to the drier open situations.

It seems to require more light, and can endure less moist conditions than the other two species.

Kaniksu National Forest.

The area chosen for control reconnaissance in the Kaniksu National Forest, Idaho, lies chiefly in the lower third of the lower West Branch of Priest River, and a portion of the upper West Branch and Binarch Creek. It is bounded on the west by the Washington-Idaho state line; on the north by Binarch Creek; on the east by Priest River; and on the south by the southern boundary of the Kaniksu National Forest. The area reconnaissanced lies in the following townships:

Township	57 N.	R. 5 W.	Boise	Meridian
"	57 N.	R. 6 W.	"	"
"	58 N.	R. 4 W.	"	"
"	58 N.	R. 5 W.	"	"
"	59 N.	R. 5 W.	"	"
"	34 N.	R. 4 W.	"	"

This area consists principally of level plateau land with hills in the eastern and northern portions, and certain low lying small hills in the eastern portion between the drainages of the West Branch and Prie st River. The rivers cut narrow, shallow valleys in the plateau lands.

Accessibility:

The country is well covered by roads. A recently improved Forest Service road runs through this area from Priest River to Nordman. Another improved road covers the area up the lower West Branch. Besides these roads there are many logging roads passable to cars. A bridge over Priest River is being constructed at Dickensheet Ford, 5 miles below the outlet of Priest Lake, connecting the road to Coolin with the West Branch area. Supplementary to the roads is a network of trails, thus making it possible to quite easily reach any portion of the area desired.

Ownership status:

By far the largest proportion of this area is in government possession. However, several sections, granted to the Northern Pacific Railway, are now owned by the Humbird Lumber Company. The Northern Pacific Railway owns several sections. Cleared homesteads are scattered through the area, on which general farming is carried on. This area lies entirely within the Falls Ranger District. The District Ranger Station is located at Torelle Falls, Sec. 22, T. 32 N. R. 5 W., Boise Meridian. Temporary stations during the fire season maintained at Boswell Ranger Station, Sec. 30, T. 33 N., R. 5 W., at Gleason Ranger Station, Sec. 3, T. 33 N., R. 5 W., and at Pelke Ranger Station, Sec. 20 T. 34 N. R. 5 W.

It seems to require more light, and can endure less moist conditions than the other two species.

Kaniksu National Forest.

The area chosen for control reconnaissance in the Kaniksu National Forest, Idaho, lies chiefly in the lower third of the Lower West Branch of Priest River, and a portion of the upper West Branch and Binarch Creek. It is bounded on the west by the Washington-Idaho state line; on the north by Binarch Creek; on the east by Priest River; and on the south by the southern boundary of the Kaniksu National Forest. The area reconnaissanced lies in the following townships:

Township 57 N. R. 5 W.	Boise Meridian		
"	57 N. R. 6 W.	"	"
"	58 N. R. 4 W.	"	"
"	58 N. R. 5 W.	"	"
"	59 N. R. 5 W.	"	"
"	34 N. R. 1 W.	"	"

The area consists principally of level plateau land with hills in the eastern and northern portions, and certain low lying small hills in the eastern portion between the drainages of the West Branch and Priest River. The rivers cut narrow, shallow valleys in the plateau lands.

Accessibility:

The country is well covered by roads. A recently improved Forest Service road runs through this area from Priest River to Nordman. Another improved road crosses the area on the Lower West Branch. Besides these roads there are many logging roads passable to cars. A bridge over Priest River is being constructed at [illegible] Ford, 3 miles below the outlet of Priest Lake, connecting the road to Coolin with the West Branch area. Supplementary to the roads is a network of trails, thus making it possible to [illegible] reach any portion of the area desired.

Ownership status:

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Reasons governing the choice of this region in which to do reconnaissance work will be discussed under the following headings: (1) timber types found, (2) age classes represented, (3) timber sales areas and (4) Ribes conditions.

Timber types found:

The largest acreage is occupied by the white pine type, in which are white fir, white pine, cedar, hemlock, larch, lodgepole pine, This type occurs on the level bench lands, cool draws, north and east slopes, and on cool south and west slopes.

Douglas fir and larch make up the principal timber type on south and west exposures. On some slopes this becomes chiefly a Douglas fir type.

On top of certain low hills, an open stand of yellow pine is found, associated with Douglas fir.

Timber age classes represented:

Owing to the large number of fires during the last hundred years, all age classes are represented, from 0 to 10 years to 200 plus years.

Timber sale areas:

On this area many timber sales have been made. These vary in age from 1912 to the present time. Many cutting plans were used: clear cutting, seed trees left singly; seed trees left in groups; selection cutting; hemlock and white fir girdled.

Ribes conditions:

Three Ribes species occur on this area: Ribes viscosissimum, R. lacustre, Grossularia inermis. The last named species is confined to stream bottoms, and moist deep soil situations, where it often grows in dense masses. R. lacustre is found generally distributed, but grows in moist situations. R. viscosissimum is confined to open places on drier situations.

III. Method of Taking Data

The work was performed on a sectional basis, four strips to a section. The forties were named as follows:

Diagram of section divided into forty acres.

N.

W. E.

2	1	2	1
3	4	3	4
2	1	2	1
3	4	3	4

S

Reasons governing the choice of this region in which to do reconnaissance work will be discussed under the following headings: (1) timber types found, (2) age classes represented, (3) timber sales areas and (4) Ribes conditions.

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Douglas fir and larch make up the principal timber type on south and west exposures. On some slopes this becomes chiefly a Douglas fir type.

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III. Method of Taking Data

The work was performed on a forty-acre basis, four strips to a section. The forties were named as follows:

Diagram of section divided into forty acres.

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

For example, the NE 1/4 of the SE 1/4 would be called SE quarter, Forty 1.

The explanation of data sheets and general methods of intensive control reconnaissance is best explained by "Instructions for Control Reconnaissance Work", a copy of which was handed each man at the beginning of the training period. The paper follows quoted in full:

"Instructions for Control Reconnaissance Work.

"I. Purpose.

To study areas or plots well distributed in order to get some definite data on different timber types in different portions of the region from the standpoint of control of white pine blister rust. Plots will be taken in each portion of the region which is more or less of a natural unit such as a particular stream drainage. Each plot will be chosen as a representative of a fairly uniform condition on the area.

"II. Plots.

A. Size:

Plots will usually consist of one section but may be only a quarter section or half section if the area that is being studied is less than four sections in extent and if smaller plots will give representative average conditions.

"B. Location:

Plots will be located within a uniform condition such as a burn or on cut-over land or in a fairly even aged stand in the white pine type, and so selected that they will give an indication of average conditions for the area. In order to give average conditions it may be necessary to take quarter sections or forties successively instead of taking them all in one section thus extending the larger plot into two or more sections.

"III. Data to be taken on each forty and method of taking it.

"A. Unit of data taking:

The unit for taking data is the forty with one strip run its center.

"B. Procedure in locating strips.

1. Locate the section corner on the section you are to work. Then offset ten chains on the section line and take this point as the beginning of your first strip. This will give you the middle of the edge of the forty. Then run your line for 80 chains giving you a strip through the first tier of forties for that section. At the end of this line offset 20 chains in a parallel and similar direction to the first offset and run a line for 80 chains through the second tier of forties of the section. Continue this process until each tier of forties in the section has been stripped once. At the end of the last strip on the

For example, the NE 1/4 of the SE 1/4 would be called SE quarter, Forty 1.

The explanation of data sheets and general methods of intensive control [illegible] is best explained in "Instructions for Control Reconnaissance Work", a copy of which [illegible] each man at the beginning of the training period. The paper follows quoted in full:

"[illegible] for Control Reconnaissance Work."

"I. [illegible]."

To study areas or plots well distributed in order to get some definite data on different timber types in different portions of the region from the standpoint of control of white pine blister rust. Plots will be taken in each portion of the region which is more or less of a natural unit such as a particular stream drainage. Each plot will be chosen as a representative of a fairly uniform condition on the area.

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Plots will usually consist of one section but may be only a quarter section or half section if the area that is being studied is less than four sections in extent and if smaller plots will give representative average conditions.

B. Location:

Plots will be located within a uniform condition such as a burn or on cut-over land or in a fairly even aged stand in the white pine type, and so selected that they will give an indication of average conditions for the area. In order to give average conditions it may be necessary to take quarter sections or forties successively instead of [illegible] in one section [illegible] or more sections.

"III. Data to be taken on each forty and method of taking it.

"A. Unit of data taking:

The unit for taking data is the forty with one strip run its center.

"B. Procedure in locating strips.

1. Locate the section corner on the section you are to work. Then offset ten chains on the section line and take this point as the beginning of your first strip. This will give you the middle of the edge of the forty. Then run your line for 80 chains giving you a strip through the first tier of forties for that section. At the end of this line offset 20 chains in a parallel and similar direction to the first offset and run a line for 80 chains through the second tier of forties of the section. Continue this process until each tier of forties in the section has been striped once. At the end of the last strip on the

section offset 10 chains and locate the section corner. Indicate the correction error on your map at the end of the last strip. If your line extends through more than one section in order to get representative conditions, it will be necessary to locate the section corner for the second section etc., in order that you may keep your work checked in, fairly closely with the land lines.

"2. Width of strip:
The width of the strip shall be one rod.

"3. Transects:
Data are to be taken in units of two chains length.

"4. Number of transects on a strip:
Plots are to be taken every other two chains as long as the line is running through fairly uniform conditions. If under this arrangement it is found that a change of type or different condition will be missed by this method, the plot which passes through this change must be taken. This applies in crossing streams especially. At any point where your line crosses a stream locate a plot on that stream.

" C. Date to be taken:
' 1. Ribes
a. Ribes date. On each 2 chain plots upon which data are taken, the species of Ribes, the average height of the bush, and the feet of live stem will be taken. Thus each bush on the plot will be classified according to species, height, and live sten when properly recorded on the form.

" b. Density %. Brush and coniferous reproduction will be stated for each 2-chain plot.

c. Remarks: Statements regarding situation of Ribes, etc.

" 2. Summaries (back of Ribes sheet).
a. Site study.
In the small site study table space is given to take a few accurate measurements by the Abney of the heights of six trees on each forty. A record of the exact diameter, age and the species of the tree will also be made. It is expected that at least three of these trees will be white pine, the other three of one or more other species. The Trees selected are to be of the dominant-codominant average for the area. The object of this data is to determine the site of the white pine type.

" b. Tree and Ribes distribution.
Check off the word which indicates the distribution

section offset 10 chains and locate the section corner. Indicate the correction error on your map at the end of the last strip. If your line extends through more than one section in order to get representative conditions, it will be necessary to locate the section corner for the section [illegible] etc., in order that you will have your work check in, fairly closely with the land lines.

"2. Width of strip:

The width of the strip shall be one rod.

"3. Transects:

Data are to be taken in units of two chains length.

"4. Number of transects on a strip:

Plots are to be taken every other two chains as long as the line is running through fairly uniform conditions. If under this arrangement it is found that a change of type or different condition will be missed by this method, the plot which passes through this change must be taken. This applies in crossing streams especially. At any point where your line crosses a stream locate a plot on that stream.

"C. Data to be taken:

"1. Ribes

a. Ribes data. On each 2 chain plots upon which [illegible] taken, the species of Ribes, the average height of the bush, and the [illegible] will be taken. [illegible] recorded on the form.

"b. Density %. Brush and coniferous reproduction will be stated for each 2-chain plot.

c. Remarks: [illegible]

"2. Summaries (back of Ribes sheet).

a. Site study.

In the small site study table space is given to take a few accurate measurements [illegible] on each forty. A record of the exact diameter, age and the species of the tree will also be made. It is expected that at least three of these trees will be white pine, the other three of one or more other species. The Trees selected are to be of the dominant-codominant average for the area. The object of this data is to determine the site of the white pine type.

"b. Tree and Ribes distribution.

Check off the word which indicates the distribution

of the timber and Ribes on the area. The tree distribution refers to the white pine distribution over the area. If the distribution of the Ribes varies according to the species then indicate the species by the first letter of the species name.

c. Underbrush and reproduction.

Indicate by a check mark the nature of the distribution of the brush and reproduction; also list the principal genera of brush and reproduction; the average height of the brush and repordouction, and the percentage of the ground covered by the brush and reproduction.

d. Rock.

Check the formation of the surface rock on the area and indicate what percent of the area is of this rocky formation.

e. Windfall.

Check the amount of the windfall and give its average height.

f. Summary, W. P. Type, and timber (W. P. Type).

This represents an analysis of the timber conditions on the area. If occasion offers, such as a rainy day, part of this information may be totaled in the field and the remainder in the office. No time must be taken from the field work to do this work, if field work can be carried on during that time.

3. Timber Sheet.

a. Reproduction:

All trees under two inches D. B. H. will be classified as reproduction. An actual count of the number of these trees will be made and tallied keeping the white pine separate from the other species. The other species will be recorded as a group.

b. Timber over two inches D. B. H.

This timber will be recorded in diameter classes and according to species. If the work is being done in larger diameter classes, the figures in the diameter column of the form may be increased to suit the diameter classes that are present. In the cases of some ownerships timber data has already been taken. If this information is available it will not be necessary to take any timber data. An effort will be made to determine whether this information is available at the beginning of the field season.

4. Mapping Sheet

On the back side of your timber data sheet is a map for each forty on a scale of 1 to 20. Each small square represents a two chain square. Topography, changes of age classes and changes in timber types are to be indicated on this map, the bounds of each to be sketched in for the forty.

a. Topography.

In areas where a topographical map is available, no

of the timber and Ribes on the area. The tree distribution refers to the white pine distribution over the area. If the distribution of the Ribes varies according to the species then indicate the species by the first letter of the species name.

c. Underbrush and reproduction.

Indicate by a check mark the nature of the distribution of the brush and reproduction; also list the principal genera of brush and reproduction; the average height of the brush and reproduction, and the percentage of the ground covered by the brush and reproduction.

d. Rock.

Check the formation of the surface rock on the area and indicate what percent of the area is of this rocky formation.

e. Windfall.

Check the amount of the windfall and give its average [illegible]

f. Summary, W. P. Type, and timber (W. P. Type).

This represents an analysis of the timber conditions on the area. If occasion offers, such as a rainy day, part of this information may be totaled in the field and the remainder in the office. No time must be taken from the field work to do this work, if field work can be carried on during that time.

3. Timber Sheet.

a. Reproduction:

All trees under two inches D. B. H. will be classified as reproduction. An actual count of the number of these trees will be [illegible]

The other species will be recorded as a group.

4. [illegible] over two inches D. B. H.

This timber will be recorded in diameter classes and [illegible]

classes, the figures in the diameter column of the form may be increased to suit the diameter classes that are present. In the cases of some ownerships timber data has already been taken. If this information is available it will not be necessary to take any timber data. An effort will be made to determine whether this information is available at the beginning of the field season.

[illegible]

On the back side of your timber data sheet is a map for each forty on a scale of 1 to 20. Each small square represents a two chain square. Topography, changes of age classes and changes in timber types are to be indicated on this map, the bounds of each to be sketched in for the forty.

a. Topography.

In areas where a topographical map is available, no

topography will be taken. Where this information is not available, changes in altitude will be recorded to the right of the center line at two chain intervals, unless a distinct break such as a ridge or ravine should occur. In the latter case additional readings and map entries shall be made at these points. Altitude will be indicated at the beginning of each strip, if known or can be determined from the contour map. It is not necessary to figure out the altitude on the field if information is available from which it may be figured out later.

"b. Timber Types:

A list of the timber types for Forest Service District 1 as taken from the 1917 edition of "Instructions for Making Timber Surveys in the National Forests" is appended to these instructions. Since we are interested in detailed data on only the white pine type sites, it will be necessary only to take data on cush types and whenever your line enters another type it will be only necessary to indicate the boundary of the different types on the forty. The type can be indicated along the type line by abbreviation. Indicate the type boundary by continuous line. All type lines should be extended to the boundary of each forty or closed within the forty so that when a final map is compiled all lines will be closed. Treeless areas will be classified according to the Forest Service classification.

"c. Timber age classes:

In the white pine types indicate the timber age classes according to age class groups. The age class will be determined by the oldest group which will next be lumbered. The age class groupings to be used are as follows: 0-10, 10-20, 20-40, 40-60, 60-80, 80-100, 100-120, 120-140, 140-160, 160-180, 180-200, 200 and over.

"5. Streams traverse.

A traverse of the main stream on the area will be made, the course of the stream plotted on the map with changes of elevation indicated on the course of the stream where readings are taken. The data taken on this traverse will be to indicate by a dotted line the width of the stream type on each side of the stream and locations of large amounts of Ribes. If the stream course is taken from known topography, then only a survey of the stream for the width of the stream type will be made."

topography will be taken. Where this information is not available, changes in altitude will be recorded to the right of the center line at two chain intervals, unless a distinct break such as a ridge or ravine should occur. In the latter case additional readings and map entries shall be made at these points. Altitude will be indicated at the beginning of each strip, if known or can be determined from the contour [illegible] information is available from which it may be figured out later.

"b. Timber types:

A list of the timber types for Forest Service District [illegible] Surveys in the National Forests" is appended to these instructions. [illegible] sites, it will be necessary only to take data on such types and whenever your line enters another type it will be only necessary to indicate the boundary of the different types on the forty. The type can be indicated along the type line by abbreviation. Indicate the type boundary by continuous line. All type lines should be extended to the boundary [illegible]

"c. Timber age classes:

In the white pine types indicate the timber age classes according to age class groups. The age class will be determined by the oldest group which will next be lumbered. The age class groupings to be used are as follows: 0-10, 10-20, 20-40, 40-60, 60-80, [illegible]

"d. [illegible]

[illegible] the course of the stream plotted on the map with changes of elevation indicated on the course of the stream where readings are taken. The data taken on this traverse will be to indicate by a dotted line the width of the stream type on each side of the stream and locations of large amounts of Ribes. If the stream course is taken from known topography, then only a survey of [illegible] type will be made."

Fig. 1.

TIMBER SHEET

Area T. R. S. ¼S. (40)

Date 192 Compassman Strip No.

Chains	Rep. W.P.	Rep. Other	D.B.H.	Tree Species W.P.							Remarks (Exposure)
20			2								
			3								
18			4								
			5								
16			6								
			7								
14			8								
			9								
12			10								
			11								
			12								
			14								
10			16								
			18								
			20								
			22								
8			24								
			26								
			28								
			30								
6			32								
			34								
			36								
			38								
4			40								
			42								
			44								
			46								
2											

Fig. 2

RIBES SHEET

Area T. R. S. ¼S. (40)

Date 192 Recorder Strip No.

Chains	Feet L.S.	Ht. in Feet					Ht. in Feet					Ht. in Feet					Den. Brush	Rep.	Remarks
		1	2	3	4	up	1	2	3	4	up	1	2	3	4	up			
20	1																		
	10																		
	50																		
	up																		
18	1																		
	10																		
	50																		
	up																		
16	1																		
	10																		
	50																		
	up																		
14	1																		
	10																		
	50																		
	up																		
12	1																		
	10																		
	50																		
	up																		
10	1																		
	10																		
	50																		
	up																		
8	1																		
	10																		
	50																		
	up																		
6	1																		
	10																		
	50																		
	up																		
4	1																		
	10																		
	50																		
	up																		
2	1																		
	10																		
	50																		
	up																		
Total	1																		
	10																		
	50																		
	up																		

Fig. 3

Restocking Study Sheet No.________________

	W.P.								W.P.						
50								100							
49								99							
48								98							
47								97							
46								96							
45								95							
44								94							
43								93							
42								92							
41								91							
40								90							
39								89							
38								88							
37								87							
36								86							
35								85							
34								84							
33								83							
32								82							
31								81							
30								80							
29								79							
28								78							
27								77							
26								76							
25								75							
24								74							
23								73							
22								72							
21								71							
20								70							
19								69							
18								68							
17								67							
16								66							
15								65							
14								64							
13								63							
12								62							
11								61							
10								60							
9								59							
8								58							
7								57							
6								56							
5								55							
4								54							
3								53							
2								52							
1								51							

Extensive reconnaissance consisted in walking over an area, determining approximate timber type and age class limits, and making general notes, on situation and abundance of Ribes. In every case a sketch map was made of each section extensively reconnaissanced, using a scale of 4" to the mile, and showing type and age class limits.

Equipment used: The equipment used in control reconnaissance consisted in the following articles for each two man crew:

2 - F. S. carrying case with straps.
2 - Small spring back binders.
2 - Box compasses
2 - Tally registers
1 - Abney hand level
1 - Two chain topographical steel tape.
1 - Diameter tape, for two crews.

Organization of the crew: The crew as normally organized consisted of two men, (1) the recorder, who was in charge of the crew and responsible for the records, and (2) the compassman, who assisted the recorder.

The division of work in running the strip seemed to work out best according to the following plan:

The compassman ran the compass, took the front end of the chain, and did therecording. The recorder took the Abney reading, and held the rear end of the chain. When the compassman had advanced two chains, he recorded his elevation at that point, and took down all data on timber and Ribes as given him by the recorder. This arrangement left the compassman free to concentrate on his compass line, without the distraction of looking for Ribes or timber. It did not work a hardship on the recorder, since it was not necessary for him to take log lengths or heights of trees, thus taking his eyes from the ground and overlooking Ribes. Both men were busy all the time. The recorder took the Abney reading while the front chainman was advancing. The compassman was busy recording data, mapping and getting his next compass shot while the rear chainman advanced.

Modification of Methods

At the beginning of the season, timber 2 inches D. B. H. and above was taken by the 20 chains of the forty, irrespective of the particular transect on which it occurred. This method worked very nicely on forties where the timber of uniform age and type, However, where there was a change either in timber type or age class on a forty, the timber recorded could not be taken as a basis for figuring the amount for either portion, since there was no way of determining on which portion a recorded tree occurred. To overcome this difficulty, it was deemed necessary to ignore the D. B. H. column on the timber sheet, and record

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Equipment used: The equipment used in control reconnaissance consisted in the following articles for each two man crew:

2 - E. S. carrying case with straps.
2 - [illegible].
2 - Box compasses
2 - Tally registers
1 - Abney hand level
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the D. B. H.'s by two chain transects.

At the beginning of the season, on areas of the same timber type and age class, timber and Ribes data were taken on alternate two chain transects. This was modified to the extent of taking Ribes data on every chain, thus increasing the percent of area covered for Ribes.

The recording of reproduction by two chain transects was unsatisfactory from two standpoints: (1) If an accurate count of all reproduction was made on a two chain transect, too much time was consumed, and Ribes were apt to be overlooked; (2) the number of reproduction per acre is not the best criterion as to whether or not an area is reproducing satisfactorily. There may be a sufficient number of seedlings per acre to constitute a fully stocked stand, and yet these seedlings may be bunched around seed trees, or in a favorable site, and the remainder of the area barren. To determine more accurately the distribution as well as the number of reproduction per acre, the practice of recording reproduction by milacres was adopted from the Forest Service.

A milacre, or as the name implies, a thousandth of an acre, is a recognized unit for measuring the restocking of an area. It consists of a square, 6.6 feet on a side making 43.56 sq. ft. Since 6.6 feet equals 10 links of a surveyor's chain, the milacre lends itself very well to the use of the chain tape.

The actual use of the milacre in the recording of reproduction was as follows: the rear chainman supplied himself with a 6.6 foot pole. He measured 10 links along the chain, laid the 6.6 foot plot at right angles across the chain, and called out to the compassman the number of seedlings on the milacre. This process was repeated along the strip. The data was recorded on the following sheet, numbered the same as the sheets giving the other data on the strip. See Fig. 3.

Additional Studies.

Several studies in addition to the regular reconnaissance strips were made as follows:

Studies relative to linear growth of reproduction of different species after cutting (1) without overstory; (2) overstory of weed trees; (3) overstory of weed trees girdled. The following form was filled in:

Year of Growth	No overstory Growth in inches				Overstory of Weed trees Growth in inches				Overstory of weed trees girdled Growth in inches			
	Spec.											
1925												
1924												
1923												
etc.												
Tot.Ht.												
Tot.Age												
% Shading												

Trees of different species were measured.

Studies relative to age and situation of Ribes were made. The age of Ribes on a timber sale of known cutting date was of particular importance in determining whether Ribes came in before or after cutting. The situation of Ribes on skid way, area burned by brush disposal, etc., had a bearing on the same problem. Age of Ribes was determined by counting growth nodes on twigs and stems and rings of growth in cross section of stem.

Studies relative to degree of shading out of Ribes were made by estimating the percent of total stem which was dead, and the percent of live stem bearing leaves. This data, coupled with the age and density of the reproduction was useful in indicating the age of a stand at which Ribes are shaded out.

IV. Work Performed
Santa, Idaho

Approximately two weeks, from June 15 to June 30, were spent in training reconnaissance men at Santa, Idaho. The personnel was made up as follows:

- 9 men to work on Federal lands.
- 2 men to work on Clearwater T. P. A.
- 2 men to work on Potlatch T. P. A.
- 2 men to work on Coeur d'Alene T. P. A.
- 2 men to work on Pend Oreille T. P. A.
- 6 men to work on Priest Lake T. P. A.

These men were all given the same training in order that all reconnaissance cound be analyzed in a similar manner at the end of the season. Four of the men who had done reconnaissance work the previous season constituted the training staff.

Four days of the period was spent in familiarizing the men with the four species of Ribes, common shrubs, coniferous growth; standardizing use of equipment as compass, topographical chain, Abney hand level, diameter tape. The remaining time was spent in running reconnaissance strips, and locating section corners and lines. Close supervision and help was given during the first days practice in reconnaissance methods. Various schemes in the division of work between the Recorder and Compassman were tried out. An effort was made to allow each crew to work in all age classes and types represented. Near the close of the training season, the same 20 chain strip was run by each crew. The results were compared in an effort to have conditions recorded as uniformly as possible. At the end of this training period the men went directly to their verious areas. All data taken in the training period were turned over to the Coeur d'Alene Timber Protective Association, since the area is in that association.

Control Reconnaissance Performed on Federal Lands, Idaho, 1925.

The work done on areas in the Kaniksu and Coeur d'Alene National Forests is discussed together for purposes of comparison. This work was performed by two crews of two men each on each forest, all four crews working under one field supervisor, who divided his time equally between the camp working on each forest.

The following tabulation shows the sections which were covered by reconnaissance intensively and extensively in both forests.

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[illegible]

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The following tabulation shows the sections which were covered by reconnaissance intensively and extensively in both forests.

Table No. 1.
Land Description of Areas on which Control Reconnaissance
Federal Lands, Idaho, was Performed, 1925.

National Forests	TWP.	Range	Sections reconnaissanced in whole or part.	
			Intensively	Extensively
Coeur d' Alene	50N.	1W. Boise M.	7,6	none
	51N.	1E. " "	29,31	15,16,17,18,19,20,21, 22,27,28,30,32,33
	51N.	1W. " "	6,7,8,9,16,18,19,21 22,24,26,27,28,29, 30,32,33,36,31	Remainder of township
	51N.	2W. " "	10,11,13,23,24	1,2,10,11,12,14,15,16, 21,22,23,24,25,26
	52N.	1W. " "	20,30	3,4,5,6,7,8,9,10,14,15 16,17,18,19,20,21,22, 23,26,27,28,29,30,31, 32,33,34,35,36
	52N.	2W " "	1	1,12,13,14,23,24,25, 26,35,36.
	53N.	1W. " "	none	29,32,33,34
	53N.	2W. " "	35	36
Kaniksu	57N.	5W. " "	4,5,8,10,11,15,18, 19,20,21,22,23,26, 27,28,29,30	7,17
	57N.	6W. " "	12,24	
	58N.	4W. " "		3,6,7,8,17,20
	58N.	5W. " "	1,2,3,9,10,12	8,11,4,26,27
	59N.	5W. " "	1,12,23,26,35	20,21,22,24,27,28,29, 30,33,34.
	34N.	4E. Willamette M.		19

Table No. 2.
Results of Control Reconnaissance, Federal Lands,
Idaho, June 25 to September 15, 1925

Area	Intensive Reconnaissance													Extensive Reconnaissance		Grand Total Acres
	Miles of Strip	Sections all or part	Acres W.P. Type by Age-classes									Not W.P. all age classes	Total Acres	Sections all or part	No. Acres	
			Cut-Over 0-10	Burned Over 0-10	10-20	20-40	40-60	60-80	80-100	100-200	200 plus					
Coeur d'Alene	72	35	3725	255	735	1495	550	145	139	2891		1825	11,760	150	94,600	106,360
Kaniksu	76	30	2557	1027	560	1605	318	185	1187	1300	520	2621	11,870	24	13,440	25,310
Total	148	65	6282	1282	1295	3100	868	330	1326	4191	520	4446	23,630	174	108,040	131,670

A greater acreage in the Coeur d'Alene National Forest (Coeur d') was covered by extensive reconnaissance than in the Kaniksu, because on the former forest there was a type map made in 1910, 4" to the mile. Also, due to the hilly nature of the country in the Coeur d'Alene National Forest, it was easier to plot types than in the level country of the Kaniksu National Forest.

V. Analysis of Time and Costs

An analysis of time and cost records is made according to the areas worked as follows: (1) Training period; (2) Coeur d'Alene National Forest; (3) Kaniksu National Forest; (4) Total area worked on Federal lands.

Training Costs and Time

Table No. 3 gives an analysis of costs of training men for reconnaissance work on Federal lands, June 15 to June 29, 1925.

Table No. 3.
Cost of Training Federal Reconnaissance Crews,
June 15 to June 29, 1925.

	Salaries	Travel			Subsistence			Grand Total
		Auto	Other	Meals	Man Meal Days	Rate Per Day	Grand Total	
	355.00	50.54	12.09	1.85	$11\frac{1}{2}$	3.00	34.50	
					$82\frac{1}{2}$	1.50	123.70	
					Misc. Subsistence		1.80	
Totals	355.00	50.54	12.09	1.85	94		160.00	579.48

The salary item is made up of the salaries of the federal men while they were training, and the salary of the Field Supervisor for that period. This latter cost was all charged to Federal Reconnaissance although he divided his training time equally between the 14 timber Protective Association men, and the 8 Federal men.

The auto travel expense is composed of the cost of the use of a personally owned five passenger automobile at seven cents per mile. This was used to transport men from Spokane to Santa; from Santa to Spokane; and from Santa to various points in the field near Santa so far away that to have necessitated walking would have cut into the training time to a very appreciable degree. Twenty one persons were carried from Spokane to Santa or in the reverse direction. The stage fare between the two places is \$3.00 and the railroad fare is \$3.03. Of all of the cost of the use of personally owned automobile is charged to transportation of men to and from Spokane, the cost per trip per man is

$\frac{\$50.54}{21} = \$2.40$. Hence it is seen that the use of the personally owned automobile saved money over other means of transportation.

The "Other Travel" expense is the railroad fare, Spokane to Santa, $3.03, for 3 men, and stage fare, $3.00 for 1 man.

"Travel meals" are meals taken while travelling.

Subsistence expenses are explained as follows: The $3.00 rate per day is per diem rate. The $1.50 rate per day is the charge made at the Buena Vista Inn, Santa, Idaho. The charge for miscellaneous subsistence is composed of various laundry services.

Analysis of Training Time

Table No. 4 which follows, shows the number of man-days employed in training crews to work on the Kaniksu and Coeur d'Alene National Forests.

Table No. 4.
Analysis of Traning Time

Crew	Man Days
Kaniksu	56
Coeur d'Alene	45
Total	101

Total Cost / Total Man Days = $579.48 / 101 = $5.737 Cost per man day.

In Table No. 4 is included the Supervisor's time charged equally to each crew.

Analysis of Costs and Time on Coeur d'Alene National Forest.

Table No. 5, given below, shows the items making up the total costs of Control Reconnaissance on the Coeur d'Alene National Forest, 1925.

Table No. 5.
Costs Control Reconnaissance Coeur d'Alene National Forest
June 25 to September 15, 1925

	Salaries	Travel			Subsistence			Equipment	Grand
		Auto	Other	Meals	Man Meals Days	Rate per Day	Total	1/3 of Cost price	Total
	1217.25	85.12	2.25	11.00	131*	.884	115.84	54.92	
					122	1.00	122.00		
					72	1.20	86.40		
					$2\frac{1}{4}$	3.00	6.75		
Totals	1217.25	85.12	2.25	11.00	$327\frac{1}{4}$	1.01	330.99	54.92	1701.53

*No cooking charge. Men prepared their own meals.

The automobile expense was that caused by the use of the supervisor's personally owned car at 7 cents per mile. It covers the cost of transporting men and equipment from Spokane to Honeysuckle Ranger Station at the beginning of the season; their return at the end of the season; the transportation of the supervisor to and from the Coeur d'Alene National Forest alternate weeks; the moving camp where possible; and an extensive reconnaissance trip taken to the lower part of the Little North Fork. The fare transportation of men to and from Honeysuckle Ranger Station, if performed by stage and electric railroad would have been \$80.50. This figure is based on the stage fare, Coeur d'Alene to Honeysuckle, \$2.50, and electric fare, Spokane to Coeur d'Alene, \$1.00. This figure of \$80.50 does not include any travel made in moving camp, taking men to work, extensive reconnaissance, or bringing in food supplies. The largest saving in the use of the personally owned car came in the saving of time. The supervisor almost invariably was able to do all of his travelling at night after work, instead of having to lose a half day or more due to travel by stage and electric railway.

Travel by means of other transportation agencies, \$2.25, is half of the transportation cost of a trip made by the Supervisor to the Upper Priest River, to investigate the use made of last year's reconnaissance work by the eradication units.

Travel meals are those taken while enroute.

In the subsistence column the following explanations are offered for the changes in rate per day.

The first rate, \$.884 per day, represented the cost of food supplies and their hauling charges other than that performed in the personally owned auto. The men did their own cooking so there was no cooking charge. Food was obtained from Forest Service Central Purchase Warehouse at Spokane, and from a local market in Coeur d'Alene.

The rate, 1.20 per day was the rate charged by the Ohio Match Company Camp 23 at Burnt Cabin. This was paid for by Form 5 A.

The rate, \$1.00 per day, was the cost of subsistence and cooking per man day at the District Ranger Station at Honeysuckle, as figured out by the Forest Service. The control reconnaissance crews furnished food to this amount per day to the District Ranger Station, and ate with the ranger.

The rate, \$3.00 per day, was a per diem rate in lieu of actual expenses when such expenses were not incurred at a government subsisted camp.

A relatively high depreciation of equipment, 33 1/3 % was charged against this year because it was figured that 3 years would

The automobile expense was that caused by the use of the supervisor's personally owned car at 7 cents per mile. It covers the cost of transporting men and equipment from Spokane to Honeysuckle Ranger Station at the beginning of the season; their return at the end of the season; the transportation of the supervisor to and from the Coeur d'Alene National Forest alternate weeks; the moving camp where possible; and an extensive reconnaissance trip taken to the lower part of the Little North Fork. The fare transportation of men to and from Honeysuckle Ranger Station, if performed by stage and electric railroad would have been $80.50. This figure is based on the stage fare, Coeur d'Alene to Honeysuckle, $2.50, and electric fare, Spokane to Coeur d'Alene, $1.00. This figure of $80.50 does not include any travel made in moving camp, taking [illegible]. The largest saving in the use of the personally owned car came in the saving of time. The supervisor almost invariably was able to do all of his travelling at night after work, instead of having to lose a half day or more due to travel by stage and electric railway.

Travel by means of other transportation agencies, $5.25, is [illegible] Upper Priest River, to investigate the use made of last year's reconnaissance work by the eradication units.

Travel meals are those taken while enroute.

In the subsistence column the following explanations are offered for the changes in rate per day.

The first rate, $.554 per day, represented the cost of food supplies and their hauling charges other than that performed in the personally owned auto. The men did their own cooking so there was no cooking charge. Food was obtained from Forest Service Central Purchase Warehouse at Spokane, and from a local market in Coeur d'Alene.

The rate, 1.20 per day was the rate charged by the Ohio Match [illegible].

The rate, $1.00 per day, was the cost of subsistence and cooking per man day at the District Ranger Station at Honeysuckle, as figured out by the Forest Service. The control reconnaissance crews furnished [illegible]

The rate, $3.00 per day, was a per diem rate in lieu of actual expenses [illegible] camp.

A relatively high depreciation of equipment, 33 1/3 % was charged [illegible]

represent a reasonable life for a good deal of the equipment, owing to loss, breakage and wearing out.

Analysis of Time Spent on Reconnaissance Coeur d'Alene National Forest, 1925

Table No. 6, which follows, shows the number of man days, and the corresponding percentages of the total time, spent in different phases of reconnaissance work

Table No. 6.
Classification of Time
Coeur d'Alene Control Reconnaissance
June 25 to September 15, 1925.

Type of Work	Actual Time				Time Charged Propertionately to Data Taking Work	
	Man Days		Percentages		Man Days	Percentages
Reconnaissance Strips	194½		54.33		300	83.80
Extensive Reconnaissance	37½		10.48		58	16.20
Total Data Taking Work		232		64.81		
Office	45½		12.71			
Camp Packing	12		3.35			
Travel	15½		4.33			
Sundays - Holidays	53		14.80			
Total Other Activities		126		35.19		
GRAND TOTAL	358	358	100	100	358	100

It is well to point out certain points in regard to Table No. 6.

1. Approximately 2/3 of the time was spent either in running reconnaissance strips, or doing extensive reconnaissance.

2. Approximately 1/3 of the time was spent in activities essential to the work but which did not result directly in the taking of data. The time of rest, Holidays and Sundays, was often spent partly in office work. Camp, packing and travel time was relatively low because of the use of the personally owned car, and because, where possible, such work was done after the completion of a day's work. Camp was moved eight times during the season. Office time consisted in rainy days, or partial days devoted to plotting reconnaissance strips, on a scale of 4 inches to the mile, and in mapping extensive reconnaissance. At the end of the season the data was in the condition in which all strips and extensive reconnaissance were plotted on maps 4 inches to the mile.

3. By charging all "other activities" time to time taking data, it is shown that over 5/6 of the time was charged to intensive reconnaissance, and nearly 1/6 of the time to extensive reconnaissance.

represent a reasonable life for a good deal of the equipment, owing to loss, [illegible].

Analysis of Time Spent on Reconnaissance
[illegible] National Forest, [illegible]

Table No. 6, which follows, shows the number of man days, and the corresponding percentages of the total time, spent in different phases of reconnaissance work

Table No. 6.
Classification of Time
Coeur d'Alene Control Reconnaissance
June 25 to September 15, 1925.

Type of Work	Actual Time: Man Days	Actual Time: Percentages		Time Charged Proportionately to Data Taking Work: Man Days	Time Charged Proportionately to Data Taking Work: Percentages
Reconnaissance Strips	131½	34.[illegible]		200	[illegible]
Extensive Reconnaissance	[illegible]	17.49		[illegible]	14.[illegible]
Total Data Taking Work	[illegible]		54.[illegible]		
Office	[illegible]	12.[illegible]			
Camp Packing	12	3.25			
Travel	15½	4.33			
Sundays - Holidays	55	14.[illegible]			
Total Other Activities	12[illegible]		[illegible]		
GRAND TOTAL	358 [illegible]	[illegible]	[illegible]	358	100

It is well to point out certain points in regard to Table No.
1. Approximately 2/3 of the time was spent either in running reconnaissance strips, or [illegible].

2. Approximately 1/3 of the time was spent in activities essential to the work but which did not result directly in the taking of data. The time of rest, Holidays and Sundays, was often spent partly in office work. [illegible] tial days devoted to plotting reconnaissance strips, on a scale of 4 inches to the mile, and in mapping extensive reconnaissance. At the end of the season the data [illegible] tensive reconnaissance were plotted on maps 4 inches to the mile.

3. [illegible]

Costs per Acre and per Man Day - Coeur d'Alene National Forest

Table No. 7 shows the costs per acre and per man day of reconnaissance work done in the Coeur d'Alene National Forest, 1925.

Table No. 7,
Analysis of Costs
Coeur d'Alene National Forest

Reconnaissance strips cost / Acres Reconnaissanced	$1425.88 / 11760	=	$.12 per acre
Extensive Reconnaissance cost / Acres Reconnaissanced	$ 275.65 / [illegible]	=	$.003 per acre
Total Reconnaissance cost / Total Acres Reconnaissanced	$1701.53 / 131670	=	$.013 per acre
Total Reconnaissance cost / Total man days	$1701.53 / 358	=	$4.753 per man day

The cost of extensive reconnaissance is low because of the large area thus worked. This work was aided greatly by the type and age class maps made in 1910 obtained from the Forest Service.

It is believed that sufficient reconnaissance strips were made in the different age classes to describe the areas reconnaissanced extensively, hence the cost of $.013 represents the cost per acre of all acres reconnaissanced.

Analysis of Costs and Time of Control Reconnaissance Performed on Kaniksu National Forest, 1925

Table No. 8 shows how the costs of reconnaissance on the Kaniksu National Forest are made up.

Table No. 8.
Reconnaissance Costs Kaniksu National Forest
June 29 to September 15, 1925

	Salaries	Travel			Subsistence			Equipment	Misc	Grand Total
		Auto	Other	Meals	Man Meal Days	Rate per Day	Total			
	1183.34	99.19	4.40	15.40	192 1/3	.75	144.97	54.92	.40	
					14 1/3	1.20	17.20			
					51 1/3	1.35	69.30			
					39	2.00	78.00			
					9 1/2	3.00	28.50			
Totals	1183.34	99.19	4.40	15.40	306 1/2	1.103	337.97	54.92	.40	1695.26
Percents	69.8		7.0				19.9	3.3	trace	

Table No. 8 shows that nearly 70% of the total cost is made up of salaries.

Auto travel covers the cost of the use of a personally owned automobile at $.07 per mile. This was used in the transportation of men and equipment from and to Spokane and points of work in the Kaniksu National Forest. It also covers other items such as bringing in food supplies, carrying men to and from work, moving camp. No attempt is made to show an actual comparison of costs of transportation by personally owned auto and by other means of transportation, because of the different places in which men were set down. However, a personally owned auto was extremely advantageous to work, because from Priest River a stage only covered the area worked two times each week. The area was so well cut up by roads that the auto was very useful in moving camps, and bringing in supplies.

The item of $4.40, the charge for other travel, consists in one railroad fare, Priest River to Spokane, and half the transportation cost of a trip made by the Supervisor to the Upper Priest River area for the purpose of investigating the value of last year's reconnaissance work to the men engaged in Ribes eradication.

Travel meals are those taken while en route.

The explanation of the different daily rates paid for subsistence are as follows:

The rate of .75 per day was the daily charge for food alone. This does not include a cooking charge, and no transportation charge, since food supplies were transported by the supervisor in a personally owned car. Nearly two months of the summer the men did their own cooking.

The rate $1,20 per day, was the cost of subsistence and cooking per man day at White's Forest Service Road Camp, as figured out by the Forest Service. The control reconnaissance crews furnished food to this amount per day to the camp while they sibsisted there.

The rate of $1.35 per day was a charge of $.45 per meal at a ranch house. This was paid for on Form 5 A/

The rate of $2.00 was the daily rate for lodging and meals paid on Form 5 A at the Dew Drop Inn.

The rate of $3.00 per day was a per diem charge in lieu of subsistence allowed the supervisor when not at a government subsisted camp.

The equipment charge of $54.92 covered 1/3 of the total cost of equipment used on the Kaniksu National Forest. This was based on an estimated depreciation of 33 1/3%.

Miscellaneous expenses covered a telephone call from Priest River to Honeysuckle Ranger Station.

Analysis of Reconnaissance Time
Kaniksu National Forest

Table No. 9 shows the number of man days devoted to necessary activities of the reconnaissance crews, on the Kaniksu National Forest.

Table No. 9.
Classification of Time Kaniksu Control Reconnaissance
June 29 to September 15, 1925.

Type of Work	Actual Time: Man Days		Actual Time: Percentages		Total Man Days Charged Proportionately to Data Taking: No.	Percent
Reconnaissance strips	207		62.73		309	93.64
Extensive Reconnaissance	14		4.24		21	6.36
Total Data Taking Time		221		66.97		
Office	25		7.58			
Camp, packing	19½		5.91			
Travel	14½		4.39			
Sundays - Holidays	50		15.15			
Total Other Activities		109		33.03		
GRAND TOTALS	330	330	100.00	100	330	

It may be noted that the type of work is divided into work actually giving data, and work necessary but not producing visible results on the ground. Practically 2/3 of the time was spent on data taking, work.

A relatively fow percent of time was spent in camp and packing because much of the camp moving was performed in personally owned automobile after working hours. Furthermore, due to the settled condition of the country, worked, it was necessary to actually prepare a camp only once during the season. The men moved camp seven times during the season.

Costs per Acre and per Man Day
Kaniksu National Forest

Table No. 10 shows the costs of reconnaissance per acre and per man day.

Table No. 10.
Analysis of Costs
Kaniksu National Forest.

Reconnaissance strips cost / Acres Reconnaissanced	$1587.78 / 11870	=	$.134 per acre intensive reconnaissance
Extensive Reconnaissance cost / Acres Reconnaissanced	$107.84 / 13440	=	$.008 per acre extensive reconnaissance
Total Reconnaissance cost / Total acres Reconnaissanced	$1695.62 / 25310	=	$.067 per acre all reconnaissance
Total Reconnaissance cost / Total man days	$1695.62 / 330	=	$5.138 per man day

It may be noted that the cost of running reconnaissance strips was higher per acre on the Kaniksu than on the Coeur d'Alene National Forest. This is due to the fact that salaries paid on the Kaniksu reconnaissance crews were slightly higher, and also due to the fact that more time was spent on other studies on the Kaniksu than on the Coeur d'Alene National Forest.

Extensive reconnaissance costs per acre were also higher on this forest because it was necessary to cover more thoroughly a section of flat land to get the limits of timber types and age classes, than a section of hilly country.

The total reconnaissance cost per acre ran high because of the relatively few sections reconnaissanced extensively.

Summary of Total Costs and Time of Federal Reconnaissance, June 15 to September 15, 1925

Summary of Costs, Federal Reconnaissance.

Table No. 11 shows the composition of costs of Federal Reconnaissance, 1925.

Table No. 11.
Total Costs Reconnaissance Federal Lands, Idaho.
June 15 to Septmeber 15, 1925

Area	Salaries	Travel	Sub-sistence	Equip-ment	Misc	Total	% of Total
Training	$ 355.00	$ 64.48	$ 160.00			$579.48	14.57
Kaniksu	1183.34	118.99	337.97	$ 54.92	$.40	1695.62	42.63
Coeur d'Alene	1217.25	98.37	330.99	54.92		1701.53	42.80
Total	$2755.59	$281.84	$ 828.96	$109.84	$.40	$3976.63	
% of Total	69.30	7.09	20.85	2.76			

Table No. 11 shows that nearly 70% of money paid out was spent for salaries. A more detailed analysis of costs in given in Tables 3, 5, and 8.

Analysis of Total Time Spent on Federal Lands, Idaho, 1925.

Table No. 12 shows how reconnaissance time was spent on Federad Lands.

Table No. 12.
Classification of Total Time, Control Reconnaissance
Coeur d'Alene and Kaniksu National Forests,
June 25 to September 15, 1925.

Type of Work	Actual Time				Time Charged Proportionately to Effective Work	
	Man Days		Percentages		Man Days	Percentages
Reconnaissance Intensive	401½		58.36		609½	88.59
Reconnaissance Extensive	51½		7.48		78½	11.41
Total Time Giving Data		453		65.84		
Office	70½		10.25			
Camp, Packing	31½		4.58			
Travel	30		4.36			
Sundays - Holidays	103		14.97			
Total Other Activities		235		34.16		
GRAND TOTAL	688	688	100	100	688	100

Time spent in training men at Santa, Idaho, is not shown in Table No. 12, because the work alone was not performed on Federal Land, but on an area in the Coeur d'Alene Timber Protective Association. It is manifestly unfair to charge time spent on one area against work done on other areas.

Costs per Acre and per Manday of Reconnaissance on Federal Lands, 1925

Table No. 13 shows the costs per acre and per man-day of all reconnaissance done on Federal Lands, 1925.

Table No. 13.
Analysis of Costs - Federal Lands.

Reconnaissance Intensive cost / Acres Reconnaissanced intensively	\$3009.54 / 23630	=	\$.127 per acre
Reconnaissance Extensive cost / Acres Extensively Reconnaissanced	\$ 387.61 / 108040	=	\$.003 per acre
Total Reconnaissance cost / Total Reconnaissanced Acres	\$3397.15 / 131670	=	\$.026 per acre
Total Reconnaissance cost / Total man days	\$3397.15 / 688	=	\$4.937 cost per man day.

Fire Fighting Performed by Control Reconnaissance Crews, Federal Lands, Idaho June 15 to September 15, 1925

A total of 19 man days were spent by the Control Reconnaissance crews on the Coeur d'Alene National Forest, fighting fire. The cost of this was borne by the Forest Service, and is not included in the above tables.

No time for fire fighting is charged against the crews on the Kaniksu National Forest. The men volumtarily fought one small fire near Falls Ranger Station. This was done after work one afternoon in four hours. The cost of this fire fighting was borne by the Office of Blister Rust Control.

Time spent in training men at Santa, Idaho, is not shown in Table No. 12, because the work alone was not performed on Federal land, but on an area in the Coeur d'Alene Timber Protective Association. It is manifestly unfair to charge time spent on one area against work done on other areas.

Costs per Acre and per Manday of Reconnaissance on Federal Lands, 1935

Table No. 13 shows the costs per acre and per man-day of all reconnaissance done on Federal Lands, 1935.

Table No. 13.
Analysis of Costs - Federal Lands.

$$\frac{\text{Reconnaissance Intensive cost}}{\text{[illegible]}} = \frac{\$3003.54}{\text{[illegible]}} = \$.127 \text{ per acre}$$

$$\frac{\text{Reconnaissance Extensive cost}}{\text{Acres Extensively Reconnaissanced}} = \frac{\$\ 393.61}{108340} = \text{[illegible]}$$

$$\frac{\text{Total Reconnaissance cost}}{\text{Total Reconnaissanced Acres}} = \frac{\$3397.15}{131670} = \$.026 \text{ per acre}$$

$$\frac{\text{Total Reconnaissance cost}}{\text{Total man days}} = \frac{\$3397.15}{695} = \$4.887 \text{ cost per man day}$$

Fire Fighting Performed
[illegible]
June 15 to September 15, 1935

A total of 19 man days were spent by the Control Reconnaissance crews on the Coeur d'Alene National Forest, fighting fire. The cost of this was borne by the Forest Service, and is not included in the above tables.

No time for fire fighting is charged against the crews on the Kaniksu National Forest. The men voluntarily fought one small fire near [illegible] hours. The cost of this fire fighting was borne by the Office of Blister Rust Control.

REPORT ON COOPERATIVE BLISTER RUST CONTROL WORK BETWEEN WESTERN OFFICE OF WHITE PINE BLISTER RUST CONTROL AND NORTH IDAHO PROTECTIVE ASSOCIATIONS.

by

C. R. Stillinger, Associate Pathologist

The cooperative work in this report has been carried on under and according to article six of the Idaho Agreement (see page 14 of Annual Report).

The period of time covered by this report is from June 15 to December 31, 1925.

The report records cooperative work done on the Priest Lake, Pend Oreille, Coeur d'Alene, Potlatch and Clearwater Timber Protective Associations.

The objects to be attained were as follows:

I. Educational

The men carrying on work in the associations as far as possible have been made familiar with the disease. One of their objects while in the field has been to disseminate information regarding blister rust among the employees of the associations and any others they might come in contact with while in the field.

II. Scouting for the Disease.

During the course of their work they have inspected native blister rust host plants for the disease. They have investigated all areas in their territory which were reported to them as infected with blister rust. No blister rust was found in any of the associations during this past season.

III. Collection of data.

Collection of any and all data regarding the timber lands of the association. This work consists in examining county records, Forest Service records, Association records, and records of private owners, for information regarding the ownership of the land and timber conditions in the areas of the association. Within the limits of this report the examination of county records, Forest Service records and association records has been largely completed and the information is being placed on large maps of the associations. This type of work is essentially winter office work.

IV. Reconnaissance work

This type of work was carried on from July 1 to September 15, in each association by a two-man crew, except in the Priest Lake Association where three crews were employed. Sample unit areas, generally a section, were made the basis of study. Four strips one rod wide were usually run through a section. Data on the timber, the wild currants and

gooseberries, brush, windfall, topography and any other factors which might have a bearing upon the cost of eradication were recorded. A report in tabular form on the areas worked in each association is given at the end of this report. The detailed records are on file in this Office.

V. Training of Personnel

Preliminary training for all men who were to do reconnaissance work was given at Santa, Idaho, from June 15 to July 1. A report of this training period is given on page 73 of the annual report.

VI. Analysis of time and expense for all associations.

The following table shows the total days of employment under the blister rust agreement from July 1, to December 31, 1925 and how the days were employed. The total expense to each party under the agreement also is shown. These figures of expense are for all the days employed on this work except in the case of the Priest Lake Association. In this case the days spent of fire were paid for by the Forest Service or Association. In this regard it is of interest to note that over 29 percent of the time of the crews working on the Priest Lake Association was used in fighting fire.

Table No. 1.
Analysis of Time and Expense from July 1 to December 31, 1925

Name of Association	Reconnaissance		Days Travel	Traverse and Location of Corners	Scouting	Office	Fire	Holidays and Sundays	Rain	Injury and sickness	Leave	Making Camp	Total No. days Employment	Expense		
	Man-days	Miles Strip												Federal	Association	Total
Pend Oreille	86	29	23	9	7	96	1	47	0	0	0		269	$332.04	$1279.48	$1611.52
Potlatch	54	$25\frac{1}{4}$	19	5	15	83	18	38	8	3	11		254	225.00	925.25	1150.25
Coeur d'Alene	94	43	19	0	9	93	0	42	0	0	0		257	370.59	1272.32	1642.91
Priest Lake	213	98	23	10	0	97	$167\frac{3}{4}$	56	0	0	7		$573\frac{3}{4}$	942.38	1085.04	2027.42
Clearwater	$70\frac{1}{2}$	$21\frac{3}{4}$	$13\frac{1}{2}$	3	$23\frac{1}{2}$	$56\frac{1}{4}$	$29\frac{1}{2}$	32	$10\frac{3}{4}$	7	0	$13\frac{1}{4}$	$259\frac{1}{4}$	$286.47	$1094.52	$1380.99

Per Acre Cost of Reconnaissance

Table No. 2 gives the cost per acre to do reconnaissance and the method of arriving at this cost.

Total cost for the field season includes all items of expense incurred from the time the men left for the field until their return. During this period no field days were excluded except in the case of the Priest Lake Association. In this case time for fire was paid for either by the Association or by the Forest Service. In figuring per day costs this time was omitted. In the other cases no special compensation for fire time was received, consequently fire days were figured in with the remainder of the time in figuring the average cost per crew days in the field. The variation in cost of reconnaissance per acre is primarily due to two things: differences in salary and differences in the amount of actual work accomplished each day. For each day of actual reconnaissance an average of about one mile per day was made on the Coeur d'Alene, Potlatch and Priest Lake Associations. The average fell considerably below this on the Pend Oreille and Clearwater Associations, and as a consequence on these associations the cost per acre was much higher than on the other associations.

Table No. 2.
Cost of Reconnaissance per Acre

Name of Association	Period of Work	Total Cost 2-man Crew	Total Crew Days in Field	Cost of Crew Day	No. Crew Days on Reconn	Total Cost Crew Days Reconn	Miles Strip Run	Cost Reconn per Mile	Cost Reconn. per Acre
Pend Oreille	7/1 -9/15	$1042.52	77	13.54	43	582.22	29	20.07	$.125
Coeur d'Alene	7/1 -9/16	971.52	78	12.45	47	685.15	43	15.93	.099
Potlatch	6/27-9/5	777.00	80	9.71	27	262.17	$25\frac{1}{4}$	13.83	.086
Clearwater	6/30-10/7	1227.81	100	12.28	35	429.80	$21\frac{3}{4}$	19.77	.123
Priest Lake	6/30-9/21	1674.69	158	10.60	106.5	1128.90	98	11.52	.072

Report on Reconnaissance by Associations.

Tables No. 4 to 9 inclusive give a summary by sections of the reconnaissance work in each association. The areas are classified as Ribes free, areas needing extensive eradication and areas requiring intensive eradication. All areas having ten Ribes per acre or less are classed as needing extensive eradication. Those having more than ten Ribes per acre are classified as requiring intensive eradication.

The following table gives a summary of all th reconnaissance work done by associations and the division of the areas according to the type of eradication necessary.

Per Acre Cost of Reconnaissance

Table No. 2 gives the cost per acre to do reconnaissance and the method of arriving at this cost.

Total cost for the field season includes all items of expense incurred from the time the men left for the field until their return. During this period no field days were excluded except in the case of the Priest Lake Association. In this case time for fire was paid for either by the Association or by the Forest Service. In figuring per day costs this time was omitted. In the other cases no special compensation for fire time was received, consequently fire days were figured in with the remainder of the time in figuring the average cost per crew days in the field. The variation in cost of reconnaissance per acre is primarily due to two things: differences in salary and differences in the amount of actual work accomplished each day. For each day of actual reconnaissance an average of about one mile per day was made on the Coeur d'Alene, Potlatch and Priest Lake Associations. The average fell considerably below this on the Pend Oreille and Clearwater Associations, and as a consequence on these associations the cost per acre was much higher than on the other associations.

Table No. 2.
Cost of Reconnaissance per Acre

Name of Association	Period of Work	Total Cost 2-man Crew	Total Crew Days in Field	Cost of Crew Day	No. Crew Days on Reconn	Total Cost Crew Days Reconn	Miles Strip Run	Cost Reconn per Mile	Cost Reconn per Acre
Pend Oreille	7/1 - [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Coeur d'Alene	7/1 - 9/15	871.50	71	12.45	47	685.15	43	15.93	.099
Potlatch	[illegible]	[illegible]	90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Clearwater	[illegible]	[illegible]	100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Priest Lake	6/20-9/[illegible]	[illegible]	154	10.50	106.5	[illegible]	[illegible]	[illegible]	.078

Report on Reconnaissance by Associations.

Tables No. 4 to 9 inclusive give a summary by sections of the reconnaissance work in each association. The areas are classified as Ribes free, areas needing extensive eradication and areas requiring intensive eradication. All areas having ten Ribes per acre or less are classed as needing extensive eradication. Those having more than ten Ribes per acre are classified as requiring intensive eradication.

The following table gives a summary of all the reconnaissance work done by associations and the division of the areas according to the type of eradication necessary.

Table No. 3.
Summary of Results

Name of Association	Area Reconnaissanced	Ribes Free	Extensive Eradication	Intensive Eradication
Coeur d'Alene	6911	4401.5	1238	1271.5
Potlatch	3920	2628	110	1182
Pend Oreille	4640	2914	667.5	1058.5
Clearwater	3480	2466	534	480
Priest Lake	17530	12733	1170	3627
TOTAL	36481	25142.5	3719.5	7619.0

Table No.4.

Summary of Reconnaissance work on the

Coeur d'Alene Timber Protective Association,

Summer 1925

by

J. W. Rodner

AREA			Trees per Acre						Brush		Total	Acres	Acres	Acres	Species of Ribes found			
			White Pine			Mixed												
Name and Location	Elevation	Chain Strip	0" to 2" No.	2" to 8" No.	8" and up No.	0" to 2" No.	2" to 8" No.	8" and up No.	Ht	Density	Acres	Ribes Free	Extensive Eradication	Intensive Eradication	lac.	vis.	iner.	pet.
Yellow dog and Downey Creek N.E.Coeur d'Alene River T.51N.R.3E.Sec.14	2600-3700	240	104	63	34	289	131	69	2½	23	640	623	0	17	X			
Yellow Dog and Downey Creek N.E.Coeur d'Alene River T.51N.R.3E.Sec.15	2600-3400	320	13	39	102	100	70	63	2½	30	640	627	0	13	X			
North Fork Coeur d'Alene River T.51N.R.3E.Sec.21	3000-4300	320	6	31	90	15	52	55	3	31	640	473	40	127	X			
St. Maries River T.42N.R.[illegible].Sec.23	2550-2850	80	654	212	5	794	84	14	2	17	160	40	0	120	X	X		X
St. Maries River T.45N.R.3W.Sec.13	3500-3890	160	910	434	1	2765	429	20	3	9	320	238	80	2	X	X		
St. Maries River T.42N.R.2E.Sec.12	3250-3661	240	394	103	1	3655	104	23	3	32	480	79½	358	42½	X	X		X
Bechtel's Wood Lot T.42N.R.1E.Sec.13	2570-2809	40	20	75	13	9	52	10	1	14	41.2	0	41.2	0	X	X		
St. Maries River T.42N.R.2E. Sec. 5	2550-2934	320	70	100	20	148	210	22	5½	20	640	192	120	328	X	X		X
St. Maries River T.43N.R.2E.Sec.30	2820-3261	320	25	84	20	45	203	38	3	22	640	398	116	126	X	X		
St. Maries River T.43N.R.1E.Sec.36	2550-2981	240	58	282	76	93	439	1113	2	11	480	398	40	42		X	X	
St. Maries River T.43N.R.2E.Sec.32	2770-3133	320	43	134	8	266	324	25	3	18	640	435	205	0	X	X		
St. Joe River T.45N.R .3E.Sec.23	3000-4600	320	14	100	18	130	399	68	3	16	640	383	80	177	X	X	X	
St. Joe River T.45N.R.3E. Sec.13	2400-3400	160	5	81	46	58	256	78	2	20	266	96	118	52	X	X	X	
St. Joe River T.45N. R.3E.Sec.14	2400-3400	200	14	70	19	18	401	70	3	16	364	219	40	105	X		X	
St.Joe River T.45N. R.3E.Sec.24	2500-3900	160	17	52	6	153	212	56	3½	23	320	200	0	120	X	X	X	
Total											6911.2	4401.5	1238.2	1271.5				

Table No.5.
Summary of Reconnaissance Work on the
Potlatch Timber Protective Association,
Summer 1925
by R. E. Myers

AREA			Trees per Acre						Brush		Total	Acres	Acres	Acres	Species of Ribes Found			
Name and Location	Elevation	Chain Strip	White Pine			Mixed			Ht: Ft	Density	Acres	Ribes Free	Extensive Eradication	Intensive Eradication	lac.	vis.	iner.	pet
			0" to 2" No.	2" to 8" No.	8" and up No.	0" to 2" No.	2" to 8" No.	8" and up No.										
Fall Creek																		
T.39N.R.3E. Sec. 16		160	65	16	16	572	101	102	2½	41	320	240	0	80	X	X		
Wetas, Fall and Deep Creeks																		
T.39N.R.3E. Sec.9		160	33	23	17	426	149	94	4	53	320	85	0	235	X	X		
Gold Creek																		
T.40N. R.3E.Sec.14	3500	320	23	5	68	352	61	91	2½	16	640	601	34	5	X			
Robinson & Gold Creeks																		
T.40N. R.3E. Sec.13	3500	320	27	2	35	303	42	78	3	39	640	471	0	169	X	X		
Meadow Creek																		
T.39N. R.3E. Sec. 20		300	105	32	16	259	103	95	4½	32	640	640	0	0				
Meadow Creek																		
T.39 N. R.3E. Sec.30		40	12	20	0	770	200	126	3½	37	80	80	0	0				
Potlatch Creek																		
T.41 R.1W. Sec.1	3000	80	11	0	0	824	0	0	3	26	160	39	0	121	X	X		
T.41 R.1W. Sec.2	3000	80	6	0	0	698	12	0	3	26	160	116	0	44	X	X		
T.41 R.1W. Sec.3	3000	80	20	9	2	68	19	9	3	26	160	160	0	0				
T.41 R.1W. Sec.4	3000	80	78	0	0	34	0	0	3	26	160	81	0	79	X	X		
T.41 R.1W. Sec.5	3000	80	0	0	0	0	0	0	3	26	160	7	76	77	X	X		
T.41 R.1W. Sec.6	3000	80	0	0	0	0	0	0	3	26	160	0	0	160	X	X		
T.40 R.3E. Sec.1	3500	40	3	0	68	361	121	307	3	35	80	3	0	77	X			
T.41 R.3E. Sec.35	3500	40	12	0	24	348	68	164	3	35	80	56	0	24	X			
T.40 R.3E. Sec.2	3500	40	0	4	40	16	12	152	3	35	80	11	0	69	X	X		
T.40 R.3E. Sec.11	3500	40	6	18	66	161	54	106	3	35	80	38	0	42	X			
Total											3920	2628	110	1182				

Table No. 6.
Summary of Reconnaissance Work on the
Pend Oreille Timber Protective Association
Summer 1925.
Harry F. Geil.

Area			Trees per acre						Brush		Total	Acres	Acres	Acres	Species of Ribes Found	
			White Pine			Mixed										
Name and Location	Elevation	Chains Strip	0" to 2" No.	2" to 8" No.	8" and up No.	0" to 2" No.	2" to 8" No.	8" and up No.	Ht. Ft.	Percent Density	Acreage	Ribes Free	Extensive Eradication	Intensive Eradication	R. lacustre	R. viscosissimum
Caribou Creek T.59, R.2[illegible].S.18	3000	320	36	12	30	304	61	80	2.2	13	640	463	40	137	X	
Trout Creek T.57, R.3W., Sec. 11	2500	320	4	24	358	964	428	498	2½	14	640	619	15	6	X	
Lightning Creek T.58, R.1E. Sec. 1	3000	320	1689	27	17	496	136	58	2.8	18	640	536	64	40	X	
Lightning Creek T.59, R.1E. Sec. 36	3000	320	538	35	92	1114	92	74	3	16	640	464	90	86	X	
Ruby Creek T.61, R.1W.,S½ S24	1000	160	93	99	2½	501	278	34	2½	17	320	190	40	90	X	X
Ruby Creek Sec. 25 T.61, R.1W. N½	1000	80	63	15	0	6090	258	28	2½	26	160	70	40	50	X	X
Berry Creek Sec. 34, T.59, R.2W, W½	2500	160	27	1	23	1050	77	74	3½	13	320	160	40	120	X	
Berry Creek T.59, R.2W. Sec. 33	2500	320	41	5	19	1309	54	98	5	42.7	640	145	180½	314½	X	
Berry Creek T.59, R.2W. Sec. 28	3000	320	81	43	11	3331	97	71	6½	43	640	267	158	215	X	
Total											4640	2914	667.5	1058.5		

Table No. 7.
Summary of Blister Rust Control Reconnaissance
Clearwater Forest Protective District
Summer, 1925
J. O. Loseth

Drainage Area and Location	Elevation	Chains of Strip	Trees per Acre						Brush		Total Acreage	Acreage Ribes Free	Acres Extensive Eradication	Acres Intensive Eradication	Species of Ribes Found			
			repro.		2" - 8"		8" - up											
			White Pine	Mixed	White Pine	Mixed	White Pine	Mixed	Height in ft.	Density Percent					Lacustre	Viscosissimum	Inermis	Petiolare
Orofino Creek T.36 N., R.5 E., Section 3	3033 to 3804	320	93	376	60	77	87	52	2.5	37	640	320	263	57	X	X	X	X
Orofino Creek T.36 N., R.5 E., Section 10	3281 to 3656	320	151	261	90	91	88	43	2.5	40	640	402	115	123	X	X		X
Orofino Creek T.37 N., R.5 E., Section 17	3000 to 3400	320	157	136	100	69	91	29	2.5	38	640	550	39	51	X	X		
Oro Grande T.38 N., R.6 E., Section 35	3500	80	85	289	25	82	79	49	3.1	33	160	78	0	82	X			X
Ore Grande T.38 N., R.6 E., Section 36	3500	60	316	206	96	55	85	51	2.5	45	120	78	0	42	X	X		
Brown's Creek T.36 N., R.5 E., Section 23	3240 to 3692	320	28	303	14	123	42	81	2.0	18	640	558	39	43	X			X
Brown's Creek T.36 N., R.5 E., Section 22	3224 to 3535	320	80	355	49	131	59	79	2.4	23	640	480	78	82	X			X
Total											3480	2466	534	480				

Table No. 8.
Summary of Reconnaissance Work on
Priest Lake Timber Protective Association
Summer, 1925
H. L. Whiting

Area					Trees per Acre						Brush		Total Acreage	Acres Ribes Free	Acres Extensive Eradication	Acres Intensive Eradication	Species of Ribes Found		
					White Pine			Mixed											
Sec	T.	R.	Elevation	Chains Strip	0" to 2"	2" to 8"	8" and up	0" to 2"	2" to 8"	8" and up	Ht. feet	% Density					Lacustre	Acerifolium	Viscosissimum
LION CREEK																			
5	62	3	3600 4600	160	65	15	47	60	77	51	3	13	640	410	0	230	X		
4	62	3	5000 6000	160	20	0	4	284	0	0	3	2	640	105	0	535	X		
3	62	3	4600 6200	160	24	12	12	1064	316	372	3	28	320	182	0	138	X	X	
1	62	3	4800 6800	160	2	4	11	20	16	50	4	70							
6	62	2	4800 6800	160	2	4	11	20	16	50	4	70							
32	63	3	4800 6200	160	92	22	45	136	94	79	3	27	640	572	0	68	X		
33	63	3	4600 6200	160	100	3	21	217	40	91	3	35	640	320	160	160	X		
34	63	3	4600 6200	320	48	12	45	167	85	95	3	13	640	480	0	160	X		
35	63	3	4600 6200	320	15	8	18	71	77	86	4	50	320	12	0	308		X	
36	63	3	5000 6000	160	17	5	16	126	42	49	4	51	640	484	0	156		X	
14	62	4	2447 3600	320	5	9	26	436	154	107	3	5	580	580	0	0			
13	62	3	3600 4600	320	22	4	37	226	98	120	4	18	640	560	40	40	X		
15	62	3	3800 6000	320	77	12	5	329	216	90	3	32	640	419	101	120	X		
17	62	3	4600 5800	160	12	1	14	125	117	103	4	42	640	480	160	0	X		
16	62	3	5200 6200	320	8	4	38	142	227	222	3	51	640	480	0	160	X		
10	62	4	2447 3000	160	64	20	28	689	146	94	4	24	150	133	0	17			X
12	62	4	3400 3900	320	25	21	41	360	108	86	3	4	640	592	8	40	X		X
11	62	4	2600 3600	320	63	13	21	652	127	88	3	4	640	563	77	0	X		
8	62	3	4000 5300	320	64	4	47	500	84	88	4	35	640	297	160	183	X		
7	62	3	3300 4600	320	35	3	32	248	72	79	4	6	640	360	120	160	X		
9	62	3	5000 6500	160	174	9	19	308	155	73	4	33	640	521	0	119	X		
2	62	4	2600 4600	320	326	12	7	608	61	58	5	26	640	372	0	268			X
1	62	4	3600 4600	320	101	8	35	418	132	83	4	10	640	453	0	187	X		
6	62	3	3400 4800	320	21	7	36	106	62	47	3	13	640	600	0	40	X		
INDIAN CREEK																			
24	61	4	4400 5600	320	32	22	33	218	121	93	3	3	640	600	40	0	X		
19	61	3	3900 4800	320	24	12	42	190	117	65	3	5	640	595	0	45	X		
20	61	3	4400 5300	160	349	2	26	419	103	77	3	10	640	325	64	251	X		
13	61	4	3400 4200	320	168	16	24	1142	138	75	3	2	160	155	0	5	X		
18	61	4	3700 4600	160	78	15	31	328	142	88	3	3	640	560	80	0	X		
17	61	4	4000 5600	160	27	2	19	482	117	77	3	3	640	323	80	237	X		
7	61	4	4000 5200	160	75	27	28	239	160	92	2	1	640	560	80	0	X		
8	61	3	3900 5000	160	80	22	38	176	114	76	3	3	640	640	0	0			
TOTAL													17530	12733	1170	3627			

ECOLOGY REPORT
1925

The purpose of this study, as outlined in 1924, is quoted as follows:

"The purpose of this study is to secure information which would be of direct and practical value in protecting white pine from blister rust.

"It has been commonly observed that Ribes are generally less numerous in mature stands of timber than in young stands. In view of this observation the ecological study was undertaken to determine the following facts:

"1. The reason for the above phenomenon.

"2. Is there a definite decrease in the number of Ribes after a definite point in the life history of a timber stand?

"3. If so what is that point?

"4. If the Ribes were removed at or after that point would they reinvade the forest?

"In the summer of 1924 this work was directed toward the determination of the time at which suppression of Ribes in coniferous reproduction would occur with the increase of shade and presumably from that as a cause. Studies made were in "burns" of varying ages. It was thought that by comparison of conditions found in comparable areas of differing ages an approximation could be made of the age class in which local control measures would be unnecessary.

"Obvious difficulties in securing needed information led to th the adoption of a plan of "sampling" by laying off zigzag strips one half rod in width and twenty-four chains in length in selected burns. Strips were laid off with compass, with angles of 90 degrees alternately to left and right at the ends of the third, ninth, fifteenth and twenty-first chains. The object of this type of strip was to eliminate in so far as possible unconscious choice of any pafticular type of vegetation, making the strip as nearly "at random" as could well be done."

The program for 1925, in general, followed along the lines of the 1924 work. Several minor additional lines of information were added to this year's work. The greater part of the studies were in the Upper Priest River drainage of Northern Idaho. Some other studies were made at the Priest Ri wer Experiment Station.

The field work during 1925 was carried on as follows:

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The program for 1925, in general, followed along the lines of the 1924 work. Several minor additional lines of information were added to this year's work. The greater part of the studies were in the Upper Priest River drainage of Northern Idaho. Some other studies were made at the Priest River Experiment Station.

The field work during 1925 was carried on as follows:

I. Census Study

This study was made within selected "burns" in the Upper Priest River region. The census data were taken on zigzag strips one-eighth chain in width and twenty-four chains in length. Strips were laid off with the compass, with angles of 90 degrees alternately to left and right at the end of the third, ninth, fifteenth and twenty-first chains. The object of this type of strip was to eliminate, so far as possible, unconscious choice of any particular type of vegetation making the strip as nearly average as could be done. A transect, as the term is used in this report, is a single linear chain of one of these strips.

A complete plant census was made only in the first rod of each transect. On the other three rods of the transect the herbaceous plants were not enumerated. During July and August, data were also taken concerning the duff condition for each transect.

The 1925 method of census study differed from the 1924 method in that all data pertaining to herbaceous vegetation were omitted on the second, third and fourth rods of each transect. In this respect only is the 1925 record decreased from that taken in 1924. The duff records mentioned above were added in 1925.

Twenty-four strips within the watershed of Upper Priest River were studied in 1925. Their respective locations are approximately shown on Map No. 1. These selected areas are sufficiently distributed over this region to be representative of general conditions.

The tabulation of this census data is incomplete, so that final summaries cannot yet be presented.

II. Meteorological Observations.

The field equipment for meteorological studies consisted of the following:

1 Maximum - Minimum Thermometer
1 Sling Psychrometer
1 Aneroid Barometer
1 Soil Thermometer

These instruments were kept, and the records taken at the Ecology Camp on Twin Creek, Upper Priest River Valley. Observations and records, while not 100 percent for the field season, are as complete as was possible.

A. Atmospheric Observations.

Temperature, relative humidity, barometer, direction of wind

and cloudiness were recorded at 6 A.M., at 12 noon and at 6 P.M. daily. Maximum and minimum temperatures were recorded once daily. These data are summarized in Table No. 1.

B. Soil Temperatures.

Soil temperatures at camp were recorded at 6 A.M., 12 noon and at 6 P.M. daily. These readings were taken at a depth of 12 inches.

Temperatures in pits at several depths, 6 inches, 12 inches, 24 inches and 36 inches, were taken each week in two contrasting situations. The first was in dense shade where the mineral soil was beneath several inches of duff. The other was on an exposed hillside in young coniferous reproduction. These data are also given in Table No. 1.

Since only one soil thermometer was available and considerable time was necessary for it to register the changes in temperature, too much time was consumed in taking these readings. The interval between readings will tend to decrease their value.

Table No. 1.
Ecology Camp - Lime Creek - 1935

Elevation 2750 Feet.

Date		Temperature Degrees Fahr.			Daily Time		Relative Humidity Percent			Barometer, Inches			Wind-Sky			Soil Temperature Degrees Fahr.			Notes
Mo.	Day	6 A.M.	12 Noon	6 P.M.	Max.	Min.	6 A.M.	12 Noon	6 P.M.	6 A.M.	12 Noon	6 P.M.	6 A.M.	12 Noon	6 P.M.	6 A.M.	12 Noon	6 P.M.	
June	22	58	69				94	74		27.24	27.1		●	♀	○	55	56		
"	23	49	74	64			93	53	70	27.36	27.3	27.37	¤	¤	¤	49	54	60	
"	24	46	80.5	65.5			93	54	70	27.47	27.3	27.35	¤	♂	♀	52	56	55	
"	25	48		63.5			93		62	27.41		27.27	♀	♂	♀	50		59	Light clouds-few
"	26	52	67	70			84	29	72	27.36	27.3	27.16	○	♂	♂	52	58	60	Light clouds
"	27	53	63.5	72			53	29.5	69	27.15	27.0	26.95	○	♂	♀	57	61	60.5	
"	28	55	62.5	70			75	34	66	26.99	27.0	27.03	♀	♂	●	58	61	62.5	Light fleecy Clouds-overcast
"	29		74.5	65.5			87	72	80	27.145	27.1	27.13	●	♂	♂	56	60	61	Overcast-Breaking up - thin clouds
"	30		79	70			85	40	59	27.22	27.1	27.165	♀	♂	♀	56	60	59	
July	1	49		65			69		75				○	○	♂	56		58	
"	2	50	76	64			84	39.5	60				♂	♀	♂	53	57	57	
"	3	46	81.5	65.5			89	32.5					♂	♂	♂	53	59	56	Light flocculent few
"	4																		
"	5			67.5					71						♂			57	
"	6	47.5	63.5	63.5			89	68	76				♂	●	●	56	58	57	
"	7	45.5		60			95		83				♂		♂	56		58	Cooler-clear - Cloudy
"	8	42.5		66			93		66				♂		●	53		59	Cooler-clear- almost overcast
"	9	45	78	69			89	36	74				♂	♂	♂	54	58	58	
"	10	53.5		69			84		72				○		○→	56		61	
"	11	52.5	83				90	42.5					○→	♀	○→	57	61		A little thunder from S. E.
"	12	56					94						●→			57		60	Overcast - precipitation
"	13	47	83	66			93	34	66				♂	♂	♂	56	60.5	62	
"	14	53					87						♂			56			
"	15	47	81.5	68.5			89	38.5	62.5				♂	♂	♀	55	59	62	Clear-Cooler
"	16	49.5	83	73			86.5	47.5	61				○→	♂	♀	56	60	62.5	
"	17	55.75	77.5	71			83.5	52.5	56.5				○	○→	♀	57.5	61	62	
"	18	47.5	78	64			72.5	42.5	62				♂	♂	♀	57	59	60	Cooler, atmosphere very smoky
"	19	43	69	65			85	62	70				♀	♂	♂	53	58	60	
"	20	46	76	65			89	42.5	72.5				♀	♂	○→	55	59.5	61	Smoke persisting- cooling
"	21	49		70			86		77				♂	♀	♀	55.5		61	Smoke clear- Few clouds-clear
"	22	60		66			78		88			27.25	♀	○	●→	58		62	
"	23	53.75	65.25	61.5	74	54	91	88.5	79.5	27.31	27.29	27.265	♀	●	ϕ	58	62	60.5	Bright-breaking up
"	24	50.75	66.5	63.75	70.5	51	100	95	88	27.245	27.24	27.21	♀	♂	♂	57	60	61	Flocculent clouds, especially in N.E.
"	25	54	66.25	65.25	69.75	54	94	79	85	27.305	27.325	27.305	○	♂	♂	57.5	60	62	Opening in N.E.
"	26	52.5		69.5	80.5	50	91		69	27.34		27.27	○		♂	57		64	
"	27	50	82.25	70	84.5	51	87	45	72	27.30	27.365	27.25	○→	○→	○→	57.5	63	62	Lightning
"	28	53	81	72	85.5	54	81	41.5	73	27.24	27.17	27.205	♀	♂	●→	59.5	61	64	
"	29	56.5	76	69.5	79.5	58	91	44	78	27.30	27.30	27.27	○→	♂	○→	60.5	63	63	
"	30	55.75	81	72.5	84	56	89	40	61	27.39	27.345	27.30	○→	♂	○→	59.25	63	63	
"	31	54.5	81			55	85	43		27.365	27.30		○	♀		59	62		
Aug.	1	52.5	88	71	86.5	53	91	79	71	27.28	27.34	27.20		♂		60	64	64.5	
"	2	58		74	80	57	83		80	27.25		27.19	○			61.5			
"	3	52	78.5	65.5	74.5	50	86	59	75	27.34	27.32	27.32		♂	○	61	61	62.5	
"	4	46.5	78.25	68.5	78.5	47.5	95	37	56	27.36	27.305	27.25	♀	♂	○	60	58	61	
"	5	47					90			27.27			♀			58.5			
"	6																		Off to fire
"	7																		
"	8		74.5	68	77.5	47		52	67		27.25	27.22		¤	¤		60	62	Smoke, haze
"	9	50.25	76	70	76	51	79	48	64	27.27	27.18	27.11	○	○→	○	59	60	61.5	Very light clouds at noon
"	10	50	65.5	64	72	50	83.5	82.5	84	27.17	27.15	27.15	♀	♀		58	60	61	
"	11	48.5	74	68	75	49	88	52	71	27.23	27.19	27.20	♀	○		56	60	62	
"	12	49.25	71	68	74	50	86	64	73.5	27.265	27.21	27.165	♀	♀	♀	58	60	63	
"	13	48.5	66.25	67	71	49	88.5	67	64	27.18	27.17	27.105	♀	○→	○→	57	58.5	61	Overcast-Light overcast
"	14	54.5	56.75	49.25	67	53	83	78.5	95	27.15	27.17	27.205	○	○	●→	58	58	55	Overcast-light overcast continual precip.
"	15	48.75	49	50	52	48.5	95	100	95	27.175	27.19	27.21	●	●	●	56	54.5	53.5	Overcast
"	16	48	57	54	57.5	43	95	79	88	27.20	27.19	27.205	●	♀	●	55	55	56	
"	17	47.5	63	59.5	64	48	93	72	83	27.25	27.245	27.27	♀	♂	♀	55	56	58.25	Clearing up:Noon
"	18	49.25	72.5	63	73.5	48.5	79.5	57	79	27.30	27.31	27.30	♀	♀	♀	55.5	57.5	59	
"	19	50.75	78.25	67.5	79.5	50.5	88	43	82.5	27.39	27.335	27.33	♀	♀	♀	56	59	61.5	Clear, warmer, later somewhat cloudy
"	20	49	82	69	82.25	50	89	36	67	27.33	27.25	27.17	♀	♂	♀	57	59	62	Few cumulus; few thin clouds
"	21	47	77.75	70	79.5	48	86	43	53	27.155	27.03	26.94	○→	♂	♂	56.5	58.5	61	
"	22	54.5	59.5	55.5	71	52.5	71	73	88	27.03	27.05	27.05	●	●	●	57.5	58.5	57.5	Overcast, rain during night
"	23	47	56	54.25	58	46	95	71	82	27.12	27.19	27.22	●	●	♂	56	56	57	Cloudy
"	24	44.5	55	53.5	56.25	44	93	78	81	27.39	27.445	27.41	♂	☿	●	53	53.5	54.5	Cloudy
"	25	38.5	69.5	60	71.5	39	93	58	67	27.43	27.35	27.27	○→	♂	♀	52	52	51	Clear; Cooler
"	26	39.25	69	62.5	72	40	91	61	62	27.19	27.13	27.11	♀	♀	●	51.5	54.5	56	Fleecy clouds slight precipitation
"	27	40		53.75	64	41	83		70	27.19		27.08	♀		♀	52		56	
"	28	39	54	49	57	39	91	73	95	27.175	27.17	27.225	○	♂	♀	51.5	51	52.5	Quite cloudy; precipitation clearing
"	29	33		59	64	34	90		51	27.345		27.29	♀		♀	48.5		54	
"	30	35	68.5		70.5	36.5	98	41		27.35	27.27		♀	♀		48.5	50		
"	31	39.5		63.5	65	40	83		69	27.22		27.09	♀		♀	48.5		57.5	
"																			
Sept.	1	49		61	70.5	50	93		75	27.15		27.195	♀		♀	53		59	
"	2	41		62.4	76	42	98		68	27.31		27.22	♀		♀	51		59	
"	3	41.5		63.5	77.5	42.5	86		67	27.25		27.105	♀		♀	52		59.5	Light clouds
"	4	43.5	71	61	71	46	81	50	68	27.17	27.17	27.17	○	♂	●	52.5	55	58.5	Light flocculent clouds rather strong winds
"	5	42		54.75	68	43.5	85		79	27.225		27.23	♀		●	53.5		55	
"	6																		
"	7			58	71	43.5			88			27.17			♂			56.5	
"	8	47	66	59.5			100	71	86	27.245	27.205	27.16	●	♂	♀	53	54	59	Light overcast
"	9	50.5		56.75			90		88	27.205		27.11	○		●	55		56	
		48.8	72.8	64.36	71.95	48.4	89.3	55.61	73.01							55.46	58.30	59.32	Summer average
		49.0	74.5	65.5	71.75	48.80	89.0	52.0	72.0							56.0	58.0	60.0	Summer median
		60.0	88.0	74.0	86.5	58.0	100	100	95							61.5	64.0	64.5	Summer maximum
		33.0	49.0	49.0	51.25	34.0	71	32.5	51							48.5	50.0	51.0	Summer minimum

SOIL TEMPERATURE DEGREES FAHRENHEIT

Date		In Over-Mature Cedar								In Young Reproduction											
		In Pit					Deep	Open	Time	In Open Pit						In Shaded Pit					
Mo.	Day	Humus	6"	12"	24"	36"	Humus	Place		Surface	6"	12"	24"	36"	Time	3"	6"	12"	24"	30"	Time
July	21	54.5	54	51.5	49	46.5			4:50 5:20												
"	24	60	54	51.5	49	46.5			3:30 5:00												
"	28	56.5	55.5	53	50	47			3:10 4:40												
Aug.	4	55	54.5	52.5	50.5	47	55	58	3:20 4:40												
"	8	55	54	51	50	48	56	61	3:30 4:50												
"	11	55.5	53	52	51	48.5	59	55	3:30 4:40	60	66.5	63	59	57	4:00 6:00	60	57	56	54	54	5:00 6:00
"	14	53.5	52.5	52	50.5	48	51.5	52.5	3:30 4:35	62	62	59.5	57.5	55	8:30 10:30	55.5	55.5	54.5	53.5	52	9:20 10:30
"	18	55.5	53.5	51.5	50.5	48.25	54	57.5	3:15 4:45	72	67	59.5	57	55	4:45 5:20	59.5	54.5	53.5	53	52	5:28 6:00
"	21	55.5	54.5	53	50.5	48	54	59	3:30 4:25	77	67	62	59	56	4:30 5:05	61	57	55	54	53	5:20 6:00
"	25	52.5	51.5	50	49.75	48.25	51	54	3:30 4:30	73	63	58.5	56	54.5	4:40 5:15	55	53	53	52.5	52	5:15 5:55
"	28	49	48.5	48.5	48.25	47.75	48.5	48.5	3:30 4:15	64	60	58	56	54.25	4:45 5:20	52.5	51.5	52	51.75	51.5	5:20 6:00
Sept.	1	52.5	51	50	49	47.5	53	54.5	3:10 4:00	62.5	62	59	56.5	55	4:15 4:55	57.5	56	54.5	52	52	5:00 5:50
"	4	52.25	51	50	49	47	53.5	55	3:30 4:20	62	65	60	57	55	4:30 5:10	57	55	54.5	52.5	52	5:15 6:00
"	8	53	51.75	50.5	49.5	48	52	54.5	3:00 4:00	59	64	59	56.5	54.5	4:50 5:30	57	54.75	54	52	51.5	5:20 6:00

III. Ribes Reproduction.

This subject was made the special study of a member of the Ecology party. His report is given herewith.

Observations on the Reproduction of Ribes in Eradicated Areas

C. C. Boling

Persuant to instructions, I carried out in the Priest River drainage observations on the reproduction of Ribes in eradicated areas. It was first thought that the information desired could best be obtained by following a checking crew, and this was done on check strip 1-9-B,1925. However, it was quickly found that the crew moved too fast to permit close observation for seedlings, that much territory covered was through situations not favorable to Ribes and that the recording of data by me served to slow down the checking crew. Areas were therefore chosen where the previous concentration of Ribes was known to have been heavy. Within these areas plots were marked off and slowly and carefully examined for the presence of Ribes. All Ribes which were older than 5 years were pulled. It was noted, however, whether these were simply missed by eradication crews or were regenerated plants and if the latter, from what portion of the incompletely eradicated plant they had sprung. Seedlings and very young plants were left undisturbed in order that future development might be observed. Data were taken showing live stem, dead stem, green stem, number of leaves, height and age for all plants found. Observations were made on their habitat. Altogether twelve areas were studied. The species studied were R. lacustre and R. inerme.

Areas 1-7. River bottom of Upper Priest River near Camp #1.
Area 8. Camp #1 Block 2 (4000 feet)
Area 9. Gary Creek near main Priest River trail.
Area 10. Jeanette Creek (3000 feet)
Area 11. Benton Creek - meadow near station.
Area 12. Benton Creek - headwaters.

Areas 1-7

Areas 1-7 are located in the rather broad bottom of the Upper Priest River on what are known as the "islands". These islands are more or less permanent sand bars which have been left by the river and are now covered with vegetation. In spring they are isolated by high water, in late summer more or less connected by sandy strips. In some cases they appear to be isolated sections of older forest. The principal covering is of Salix and Cornus, the average shade being perhaps 80-90%, with only several patches of sunlight filtering through the foliage from about 8-9 A.M. and 4-5 M.P., depending on the location. Coniferous trees are few and mostly young. Coniferous reproduction is variable, all local species being observed except Pinus contorta and Pinus albicaulis. While a dense shade is formed, nevertheless, underneath the canopy there is a considerable degree of diffuse light. In some places a condiderable degree of

This subject was made the special study of a member of the Ecology party. His report is given herewith.

Observations on the Reproduction
of Ribes in Eradicated Areas

[illegible]

Persuant to instructions, I carried out in the Priest drainage observations on the reproduction of Ribes in eradicated [illegible]. It was first thought that the information desired could best be obtained by following a checking crew, and this was done on check strip 1-9-2,1926. However, it was quickly found that the crew moved too fast to permit close observation for seedlings, that much territory covered was through situations not favorable to Ribes and that the recording of data by me served to slow down the checking crew. Areas were therefore chosen where the previous concentration of Ribes was known to have been heavy. Within these areas plots were marked off and slowly and carefully examined for the presence of Ribes. All Ribes which were older than 5 years were pulled. It was noted, however, whether these were simply missed by eradication crews or were regenerated plants and if the latter, from what portion of the incompletely eradicated plant they had sprung. Seedlings and [illegible] might be observed. Data were taken showing live stem, dead stem, green stem, [illegible]. Observations were made on their habitat. Altogether twelve areas were studied. The species [illegible] R. [illegible] and R. [illegible].

Areas 1-7. River bottom of Upper Priest River near Camp #1.
Area 8. Camp #1 Block 2 (4000 feet)
Area 9. Gary Creek near main Priest River trail.
Area 10. Jeanette Creek (5000 feet)
Area 11. Benton Creek - meadow near station.
Area 12. Benton Creek - headwaters.

Areas 1-7

Areas 1-7 are located in the rather broad bottom of the Upper Priest River on what are known as the "islands". These islands are more or less permanent [illegible] covered with vegetation. In spring they are isolated by highwater, in late summer [illegible] appear to be isolated [illegible] of older forest. The principal cover is of Salix and Cornus, the average shade being perhaps 80-90%, with only several patches of sunlight [illegible] A.M. and 4-5 P.M., depending on the location. Coniferous trees are few and mostly young. [illegible] being observed [illegible] Pinus [illegible]. While a dense shade is formed, nevertheless, underneath the canopy there is a considerable degree of diffuse light. In some places a considerable degree of

under vegetation has developed, even shrubs such as Rubus parviflorus and Pachistima myrsinites being present. Elsewhere the moist sand is almost devoid of vegetation, save occasional patches of moss. The herbaceous vegetation is quite varied, the species being relatively numerous, ranging from typically subalpine species as Saxifraga bronchialis to species characteristic of lower valleys such as Castilleja miniata or Sphaeralcea rivularis, and including species commonly characteristic of dry open habitats such as Campanula retundifolia and those characteristic of deep shaded woods such as Circaea pacifica.

The combined areas total 1.80 acres, according to the estimate made by Mr. Rockie, who also prepared a map, showing the location of the various plots. 192 Ribes plants were found.

Under 6 years					6 years or more		
1	2	3	4	5	Miss	Regeneration by layer	Regeneration by crown
*104	35	12	7	8	18	7	1

*Of these 30 large enough to constitute a "miss".

Almost without exception Ribes seedlings were found in situations free from any herbaceous vegetation. It is possible that this is due merely to the increased shade offered by the herbaceous vegetation. In these areas the seedlings are rather evenly distributed suggesting tha that they may have been deposited by high water. Rarely two were found growing together.

Area No. 8.

Is situated in Block 2 of Camp #1 on the upper part of the creek on the Fly Camp trail, at the second crossing. The lower limit is marked on a small Fir 10 feet tall, a rod above the trail on the north bank. The small stream itself descends largely under and over small moss covered windfalls, through reproduction consisting of Picea, Pinus monticola, Thuja, Abies lasiocarpa, together with Alnus sinuata and Salix 10 to 15 feet tall. Rubus parviflorus, Pachistima, Vaccinium membranaceum, Spiraea lucida, are the principal shrubs. There is some herbaceous covering of thin Xerophyllum, Habenaria, Tiarella, Voila, Osmorhiza, Mitella, Listera, Galium, Asarum, and Clintonia. While the narrow bottom is often a mass of rotten debris and soil, the sides for 2 or 3 feet may have a good leaf mold or occasionally needle duff. A strip approximately one rod wide and ten chains long was taken above the trail. The upper limit is marked on a log lying across the stream breast high; it is well up on the flat. The area is approximately one-fifth acre. A total of 350-plus seedlings were found, but due to bunching, assuming that only 1 of a bunch survived, the number would be approximately 30.

under vegetation has developed, even shrubs such as Rubus parviflorus and Pachistima myrsinites being present. Elsewhere the moist sand is almost devoid of vegetation, save occasional patches of moss. The herbaceous vegetation is quite varied, the species being relatively numerous, ranging from typically subalpine species as Saxifraga bronchialis [illegible] characteristic of moist valleys such as [illegible] or [illegible]ces rivularis, and including species commonly characteristic of dry open habitats such as Antennaria [illegible] and some characteristic of deep shaded woods such as Circaea pacifica.

The combined areas total 1.90 acres, according to the estimate made by Mr. Bockie, who also prepared a map, showing the location of the various plots. 190 Ribes plants were found.

Under 6 years					6 years or over		
1	2	3	4	5	Miss	Regeneration [illegible]	[illegible]
*104	25	12	7	8	18	7	1

*Of these 30 large enough to constitute a "miss".

Almost without exception Ribes seedlings were found in situations free from any herbaceous vegetation. It is possible that this is due merely to the increased shade offered by the herbaceous vegetation. In these areas the seedlings are rather evenly distributed suggesting that they may have been deposited by high water. Rarely two were found growing together.

Area No. 8.

Is situated in Block 2 of Camp 41 on the [illegible] of the creek on the Fly Camp trail, at the second crossing. The lower limit is marked on a small Fir 10 feet tall, a rod above the trail on the north bank. The small stream itself descends largely under and over small moss covered windfalls, through reproduction consisting of Abies lasiocarpa, Picea, [illegible], together with Alnus sinuata and Salix [illegible] feet tall. [illegible], Pachistima, [illegible], [illegible], are the principal shrubs. There is [illegible] Lycopodium, [illegible], [illegible], Viola, [illegible], [illegible], [illegible], and [illegible]. While the [illegible] bottom is often a mass of [illegible] and soil, the slope for 2 or 3 feet may have a good leaf mold or occasionally needle duff. A strip approximately one rod wide and [illegible] long was taken above the trail. The upper limit is marked on a log lying across the stream breast high; it is well up on the flat. The area is approximately one-fifth acre. A total of 350-plus seedlings were found, but due to bunching, assuming that only 1 of a bunch survived, the number would be approximately 30.

Under 6 years					6 years and over		
1	2	3	4	5	Miss	Layer	Crown
350	3	5	1	0	16	14	1

Area No. 9.

Is located on Gary Creek approximately 3 chains east of the trail. The lower limit is marked on two hemlocks which are on each side of the stream a rod and a half apart. The lower part of the area, for about two chains is very open, the rather steep bank covered with Phegopteris, Linnaea, Tiarella, Clintonia, abundant Lycopodium, some Taxus and a scattering of Vaccinium. Boulders are scattered about and quite a bit of mossy windfall lies in the creek. Timber is mature. The duff averages an inch or more, largely composed of hemlock. A strip was taken parallel to the creek approximately two rods wide and two chains long or a little less. No Ribes were found therein. A similar strip was taken for two chains further. This led into young reproduction, chiefly hemlock. A few seedlings were found therein. The angle between the two arms of the creek is quite varied in vegetation, a part being characterized by Devil's club, a part by dry dense reproduction, a part open and soggy filled with Equisetum and low herbaceous vegetation. By reason of the amount of windfall and upturned stumps it was expected that numerous seedlings would be found. This was true in one case only, and these were grouped together, quite evidently being the offspring of a large eradicated bush. The area is perhaps one-eighth of an acre.

18 seedlings in one group on an upturned stump	1 8-year old miss.

Area No. 10.

Is situated near the confluence of Jeanette Creek with the Upper Priest River. The upper limit is fifty feet below the point where "Jeanette Creek" is carved on a Birch, extending at this point to either canyon wall. Jeanette Creek has here a rather broad bottom which widens quickly and is filled with alluvial soil and a heavy mulch of broadleaf debris and needles. The ground is broken by numerous windfalls and is moist often for several feet on either side of the creek. Alder, Birch, Willows, and Aspens are abundant in the bottom, together with some hemlock and cedar in the openings. Herbaceous vegetation is dense, consisting of ferns, Rubus parviflorus, Claytonia, Asarum, Senecio, Galium, Actea, Tiarella, and grasses and Umbelliferae. The lower limits are blazed across the stream approximately two rods below the upper limits. The total area is approximately one-third acre.

A total of 229 seedlings were found. Many of these, however, were bunched and if it be assumed that only one of a bunch survived, this number would be reduced to 119. Practically all seedlings here, as elsewhere, were found in unoccupied soil, that is to say, where some change, such as an upturn or a windfall or badly rotted log being broken up by crews walking along a new trail, had created open spaces free from com-

[illegible]

Is located on Gary Creek approximate [illegible] east of the trail. The lower limit is marked on two hemlock [illegible] on each side of the stream a rod and a half apart. The lower [illegible] about two chains is very open, the rather [illegible] [illegible], [illegible], *Tiarella*, [illegible], [illegible] *Taxus* and a scattering of *Vaccinium*. Boulders are [illegible] quite a bit of mossy windfall lies in the area. [illegible] duff averages an inch or more, largely composed of [illegible]. [illegible] taken parallel to the creek approximately two rods wide and [illegible] long or a little less. No Ribes were found therein. A similar [illegible] was taken for two chains further. This led into young reproduction, chiefly hemlock. A few seedlings were found therein. The parts between the two arms of the creek in quite varied in vegetation, a part being characterized by Devil's club, a part by dry dense reproduction, a [illegible] open and soggy filled with *Equisetum* and low herbaceous vegetation. By reason of the amount of windfall and upturned stumps it was [illegible] that numerous seedlings would be found. This was true in one [illegible] and these were grouped together, quite evidently being [illegible] a large eradicated bush. The area is perhaps one-eighth of [illegible]

18 seedlings in one group on an upturned stump — 1 3-year old miss.

Area No. 10.

Is situated near the confluence of [illegible] Upper Priest River. The upper limit is fifty [illegible] "Jeanette Creek" is carved on a Birch, extending [illegible] canyon wall. Jeanette Creek has here a rather broad [illegible] quickly and is filled with alluvial soil and a heavy [illegible] debris and needles. The ground is broken by numerous windfalls and is [illegible] [illegible] lock and cedar in the openings. Herbaceous vegetation is dense, consisting of ferns, [illegible], [illegible], [illegible], [illegible], *Tiarella*, and grasses and Umbelliferae. The lower limits are blazed across the stream approximately two rods below the upper limits. The total area is approximately one-third acre.

A total of 229 seedlings were found. Many of these, however, were [illegible] [illegible] such as an upturn or a windfall or badly rotted log being broken up by crews walking along a new trail, had created open spaces free from com-

petition with other species. Almost none were found in duff; almost none were found where herbaceous vegetation was dense; a few were found beneath ferns, but then in an open space beneath the ferns. There is some reason to ponder such occurrences and to wonder whether it is due to the fact that the berries have happened most often to fall into the opening left by the eradication of a large bush, or else having already fallen there were given opportunity for germination, due to the pulling of the bush. It would be of interest to determine in such cases whether berries dropping from a large bush would germinate normally beneath it, or whether the eradication of the bush brought delayed germination. I do not recall having observed seedlings at any time beneath large bushes; at the same time, with the exception of the latter part of the summer, I have never watched carefully for them in such places.

Under 6 years					Over 6 years		
1	2	3	4	5	Miss	Layer	Crown
229	2	2	5	2	10	11	1

Area No. 11.

This area lies along Benton Creek in the meadow near the Experiment Station. The meadow is cultivated for hay. The stream banks are covered with willow and dogwood with a dense growth of Spiraea menziesii and grasses along the outer margin. It may be divided into two portions, the first, about forty paces long by four paces wide, parallels the stream along both banks between the bridge into the south meadow and the upper limits of that meadow; the other portion is contiguous and lies above the south meadow extending in a direction parallel to the stream for fifty to sixty feet and from the forest to the north meadow, approximately 100 feet. In early spring the bottom is more or less submerged. Before eradication Ribes inerme was very dense. No seedlings were found and but one 2 year old. Few direct misses were found, all plants having been regenerated, chiefly from layers. A number, however, were from crown sprouts. Growth was more vigorous in the case of the latter. Often times runners were found which were buried eight to ten inches in leaf mold which had put forth new growth. The difficulty of eradication of these plants is apparent. The sizes of a few plants, which have regenerated from the crown were carefully tabulated and are herewith included.

Plant	1 year wood	2 year wood	3rd year wood
a	23" 10 branches	8½" 5 branches	8" 3 branches
b	20" 5 branches	6½" 5 branches	3" 3 branches
c	10" 5 branches	5 2/3" 5 branches	9" 4 branches
d	49" 11 branches	14" 7 branches	27" 5 branches

petition with other species. Almost none were found in duff; almost none were found where herbaceous vegetation was dense; a few were found beneath ferns, but then in an open space beneath the ferns. There is some reason to ponder such occurrences and to wonder whether it is due [illegible] opening left by the eradication of a large bush, or else having already [illegible] of the bush. It would be of interest to determine in such cases whether [illegible] or whether the eradication of the bush brought delayed germination. I do not recall having observed seedlings at any time beneath large bushes at the same time, with the exception of the latter part of the summer, I have never watched carefully for them in such places.

Under 6 years					Over 6 years		
[illegible]					[illegible]		
22	2	2	5	2	10	11	1

Area No. 11.

This area lies along Benton Creek in the meadow near the Experiment Station. The meadow is cultivated for hay. The stream banks are covered with willow and dogwood with a dense growth of *Spiraea menziesii* and grasses along the outer margin. It may be divided into two portions, the first, about forty paces long by four paces wide, par- [illegible] meadow and the upper limits of that meadow; the other portion is contiguous and lies above the south meadow extending in a direction parallel to the stream for fifty to sixty feet and from the forest to the north meadow, approximately 100 feet. In early spring the bottom is more or less submerged. Before eradication *Ribes inerme* was very dense. No seedlings were found and but one 2 year old. Few direct misses were found, all plants having been regenerated, chiefly from layers. A num- [illegible] case of the latter. Often times runners were found which were buried eight to ten inches in leaf mold which had put forth new growth. The [illegible] few plants, which have regenerated from the crown were carefully tabulated and are herewith included.

Plant	1 year wood	[illegible]	[illegible]
[illegible]	25° 10 branches	[illegible] 5 branches	[illegible] 3 branches
b	20° 5 branches	6½° 6 branches	5° 3 branches
[illegible]	[illegible] 5 branches	[illegible] 5 branches	[illegible] 4 branches
[illegible]	49° 11 branches	14° 7 branches	[illegible] 5 branches

The situation in which Ribes inerme is found is marshy in spring, the plants being actually in water and mud in many places. This dries out in summer and since the covering is composed of twig and leaf debris from the willows, becomes quite dry to a depth of several inches. It was noted that all layered plants which had survived were quite deeply embedded, that is to say, four or six inches or more. Compared with growth from crown which had remained in, these layers had made comparatively poor growth and showed much dead wood especially last year's wood. This suggests that eradication in the spring in such situations permitted many fragments, left in the ground, to put out branches, but due to the drying out of the leaf mold, the shallow-rooted plants perished. I believe eradication is easier in such situations when the ground is dry. It is suggested that eradication in such areas be done in summer, when root stocks left in the ground would be more likely to dry out before having an opportunity to regenerate.

2 years	3 years	Layer	Crown	Miss
1	2	72	5	0

Area No. 12.

Is located in the growth of Alder and Mountain Ash which lies below the spring at Benton Creek. An area approximately 1 chain square was taken parallel with the creek just below the trail. Beneath the Alder clumps there is a dense growth of herbaceous vegetation consisting largely of Claytonia, Actea, and Mertensia.

Less than 6 years					6 years or more		
1	2	3	4	5	Layer	Crown	Miss
1	2	0	3	1	3	3	0

The following are random observations made at various times in the different areas previously described.

There is little difference in the apparent vigor of seedlings whether in 20% or 80% shade.

In newly eradicated areas it appears that a majority of seedlings are resultant from berries dropping during eradication and not improbably trampled into the earth.

Several instances were observed where Ribes lacustre put out two distinct segments of growth during the season. One specimen of these was preserved.

The most common cause of regeneration is from layering; the most serious from crown growth. No regeneration from roots was found.

The author is convinced that the occurrence of Ribes seedlings in open spaces, together with the habitat of Ribes when found in closed

associations (as for example, the common occurrence of *Ribes lacustre* on upturned stumps in mature forests), are associated with the lack of herbaceous competition.

The following are suggestions which may be applied to crew work. They are obtained from study of crew methods in various situations:

Regeneration of plants in moist situations is often due to careless hanging of eradicated bushes. It is suggested that in such situations an individual be charged with gathering together eradicated plants from time to time and disposing of them in toto.

A hand tool of small dimensions suitable for digging and provided with an edge is recommended for use with Ribes. If it is found that regeneration occurs from root sprouts, simple chemical eradication, as by covering cut ends with salt, may be used with the tool.

It is suggested that foremen or checking crews keep notes on the cause of missed Ribes at the time they are missed.

It is suggested that the strips be run somewhat up hill rather than down, and particularly that they be run away from the sun rather than into it. Careful planning of strips within the block before work is commenced would often result in higher efficiency of eradication.

When the crews are working in echelon formation with a line man who moves a little too rapidly, contact between men is very readily lost. It is suggested that a slower man be used as a lineman, other things being equal.

Many misses are due to walking over a bush while looking on either side. It is suggested that this is due to the strip being too wide.

From personal experience in eradication, as well as with experience obtained be following eradication crews both in the Benton Creek drainage and in the Upper Priest River drainage, it is strongly impressed upon the writer that frequent shifting of crews from block to block would result in increased efficiency. It is even suggested that as a reward for superior work crews be exchanged between camps or that similar devices be adopted.

The personnel of the crews was observed to be quite variable. It is suggested that one each of the older men, who are in residence at the University of Washington, University of Idaho, and Washington State College, be commissioned as scouts to watch during the year for suitable material for the coming season, and that the recommendation of these men be given full weight. The author has such men in mind as,

associations (as for example, the common [illegible] [illegible] Lacustre or upturned stumps in mature forests), are associated with the lack of herbaceous competition.

The following are suggestions which may be applied to crew work. They are obtained from study of crew methods in various situations:

Regeneration of plants in moist situations is often due to careless handling of eradicated bushes. It is suggested that in such situations an individual be charged with gathering together eradicated plants from time to time and disposing of them in toto.

A hand tool of small dimensions suitable for digging [illegible] with an edge is recommended for use [illegible]. [illegible] that regeneration occurs from root sprouts, [illegible] cation, as by covering cut ends with salt, [illegible] tool.

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Anderson	University of Washington
Thaanum	Washington State College
Fullerton	University of Idaho

The following are rules to be stressed with pullers:

(1) hang carefully
(2)pull from bottom and not from tops
(3) trace runners before pulling
(4) cooperate with your neighbor and do not disturb or distract him by talking to him.
(5) never walk along a log, but along one side of it and see that the opposite side of it is covered by your neighbor.

Additional Studies on Ribes Reproduction

Besides the above special report on Ribes reproduction, observations were made by other members of the party. Studies at the Priest River Experiment Station were centered on determining the extent of Ribes reproduction and germination following the eradication in 1923.

The results and conclusions concerning these studies are briefly summarized herewith.

1925 Check on 1923 Eradication - Stream Type
Priest River Experiment Station

Live Stem Classes	½' L.S.	1'	3'	5'	10'	25'	50'	75'	100'	Over 100'
Number of R. lacustre Bushes, 1925	40	7	7	6						
Number of G. inermis Bushes, 1925	11	4	8	4	6	1				
Number of Acres Checked	1.66 (for lacustre)					0.35 (for inermis)				
Number of Ribes per acre	37.9 (lacustre)					96.5 (inermis)				

While the actual number of Ribes bushes now found seems high, yet the infecting power of these bushes is probably low. A very large majority of the present bushes are practically seedlings. Very few of them have a leaf-area of more than a few square inches. Furthermore, the bushes now growing are heavily covered and hidden by the other taller vegetation. This will tend to further decrease their infecting power. Many of the remaining bushes will soon be shaded out. Reproduction conditions are at their best in stream type.

IV. Seeding and Germination.

A. Duff as Affecting Germination.

Conferences were held with silvicultural specialists at the Priest River Experiment Station. New lines of investigation were suggested. The duff, in that it largely influences the seasonal soil moisture and temperature, may be at least a partial explanation of the presence or absence of Ribes under different conditions. Some data were taken on the census strips, and numerous records of soil temperature were gathered, in an initial effort to determine any relations which may exist.

B. Animal Seed Distribution.

Bird and animal life was closely watched during this entire field season, with the hope of detecting some clues regarding the reseeding of Ribes.

The results of this study permit no deductions the observations

proving too limited for use. Chipmunks and grouse are known to eat the fruits of Ribes lacustre. The extent of their appetite for this sort of food is unknown. Undoubtedly, other animals are also more or less responsible for the spread of the seeds of Ribes. Much observation and continued study along this line will be necessary before any conclusive decudtions can be made.

C. Laboratory Tests of Germination.

Laboratory tests for germination of the seed of R. lacustre and R. viscosissimum are in progress at the present time. No results are yet available.

V. Live Stem Leaf-Area Ratio

During the 1925 field season one hundred bushes each of R. lacustre and of R. viscosissimum were selected. The following data were taken for each bush.

Location
Timber conditions
Windfall conditions
Fire history
Soil conditions
Associated plant species
Amount and kind of shade
Age of bush
Number feet of Livestem
Number feet of Deadstem
Number feet of New Growth
Number of Leaves

Leaves of these plants were collected, dried, and are now being measured as to leaf-area. Leaves of R. petiolare, R. lacustre, and G. inermis were likewise collected by the chemical eradication party at Santa, Idaho.

The tabulation of the data collected is now in progress, but no results are yet completed.

VI. Summary

Relatively little of the data from the ecology studies is entirely tabulated, so that no attempt at generalization can now be made.

EXPERIMENTAL CHEMICAL ERADICATION IN THE WEST

Purpose of Project.

The purpose of this project is to determine the feasibility of eradication of wild Ribes by application of chemicals. It is believed that chemical eradication, if practical, will be of particular value in locations where Ribes occur in such profusion as to make hand pulling, the present standard method of eradication, prohibitive in cost.

Previous Work.

Experiments were commenced in the East at Hobart, N. Y., and were carried on by A. S. Regan during the years 1917-18-19-20-21. Work in the East revolved largely around three chemicals - viz - fuel and dip oils, common salt, and sodium arsenite. When applied in sufficient concentration at the base of the plant these chemicals caused death, but it was found necessary to saturate the ground at the base of the plant and the problem of killing the Ribes with a single application of spray was not solved.

During the summer of 1924 experiments were started in the West under the direction of Mr. W. F. Huppke. A large number of bushes in the vicinity of Wallace, Idaho, on Placer and Lake Creeks, were treated with various chemicals and accurate data were taken, covering initial and final condition of the bushes, general notes on the situation or site, brush factors, the p_H value of the soil, and all records such as quantity of chemical used and method and time of application. This data together with a weather log was carefully recorded in all instances. Chemicals used were selected from, (a) - inorganic salts of heavy metals, (b) - oxidising acids, (c) - bases, (d) - organic acids (e) - oils. This work was checked over in June by Mr. Huppke and the writer and although the information gleaned from the plots pointed to some very interesting possibilities, on account of the relatively small number of bushes to which any one chemical had been applied it was difficult to say definitely whether dead stem andlowered vitality had been caused by the chemical or by other external factors, such as injury by frost or mechanical means.

Some work was also done at Berkeley, Calif., in the winter of 1924, on wild Ribes bushes along the Skyline Boulevard and in Wildcat canyon. Mr. Root, Assistant Pathologist in charge of our work in California, checked over the plots last spring and an excerpt from his letter of June 15th reads as follows:

"The most efficient chemical used seemed to be the acid sludge group. The bushes so treated, though still leaved out had the crowns or branches just above visibly affected. The cambium layer was turning a dark color. Many of the bushes were on a hillside and the chemical has run off to some extent. By slightly excavating to expose the crown it is likely the sludge would have a more active and deadly effect.

[illegible]

[illegible]

The purpose of this project is to determine the feasibility of eradication of wild Ribes by application of chemicals. It is believed that chemical eradication, if practical, will be of particular value in locations where Ribes occur in such profusion as to make hand pulling, the present standard method of eradication, prohibitive in cost.

[illegible]

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"The most efficient chemical used seemed to be the acid sludge group. The bushes so treated, though still leaved out had the crowns or [illegible] color. [illegible] sludge would have a more active and deadly effect.

None of the chemicals observed, which were used as sprays, seemed to have any permanent deleterious effect upon the bushes. Tops and sprouts from the bottom showed abundant vitality still."

Work Performed During 1925 Season.

General statement: When the program of work for 1925 was outlined it was decided to modify somewhat the general method of attack. After discussion, Mr. W yckoff and the writer agreed that the problem fell naturally into two parts: (a) the search for a chemical and (b) the application of that chemical under field conditions.

The summer field season lends itself to the study of application while during the winter some real research work could be conducted on specific phases of the problem suggested by what we might almost call the trial and error methods of the summer. With these ideas in view a somewhat more extensive application of individual chemicals which in previous work had showed the greatest promise was planned. The best method of attack, and the only one in fact that can be used under a great many conditions is that of spraying. Other means, such as soil, crown and root injections were of course to be given a fair trial, but attention was for the most part to be focused on spraying, with particular attention paid to the possible crew methods of chemical eradication. Some time was spent deciding on a suitable experimental location. For our purposes a spot easily reached by transportation facilities was of course essential and a heavy concentration of Ribes that would give us a maximum field of experimentation over a relatively small area was also desirable. Lake Creek, about three miles out of Wallace, Idaho, was chosen as the first experimental location. Four assistants were engaged for the summer's work and on June 17th a crew of four men (augmented by one man on June 24) commenced work on this area. Experiments at Lake Creek were completed on July 6th and camp was moved to Santa, Idaho, where an exceedingly desirable situation of G. inermis and R. lacustre, had been located. This area at Santa was a 15 year burn, quite open and free from brush and windfall in which G. inermis and R. lacustre grew profusely. This constituted different working conditions from those at Lake Creek - where experiments were conducted on R. petiolare and R. lacustre, representing that particularly moist, marshy stream type where R. petiolare abounds. Chemical experiments and data taking were completed at Santa on September 11th and the crew returned to Wallace to take data over that area, finishing that work on September 22d.

Method of laying out the Plots.

I - Wallace, Idaho. The creek and road parallel to it were first traversed and carefully mapped and three one acre plots were selected from the adjacent area. These plots and subsequent ones at Santa were laid out 66 ft. x 660 ft., in rectangular form by means of a box compass and a 100 ft. chain. Six stations each 100 ft. long and one station of 60 ft. marked out the rectangular length of the plot. Each station was marked by means of a cedar stake 3 ft. long and about 3 inches square. At least one corner

None of the chemicals observed, which were used as sprays, seemed to have any [illegible] effect upon the [illegible]. [illegible] from the bottom showed abundant vitality still."

[illegible] during 1935 [illegible].

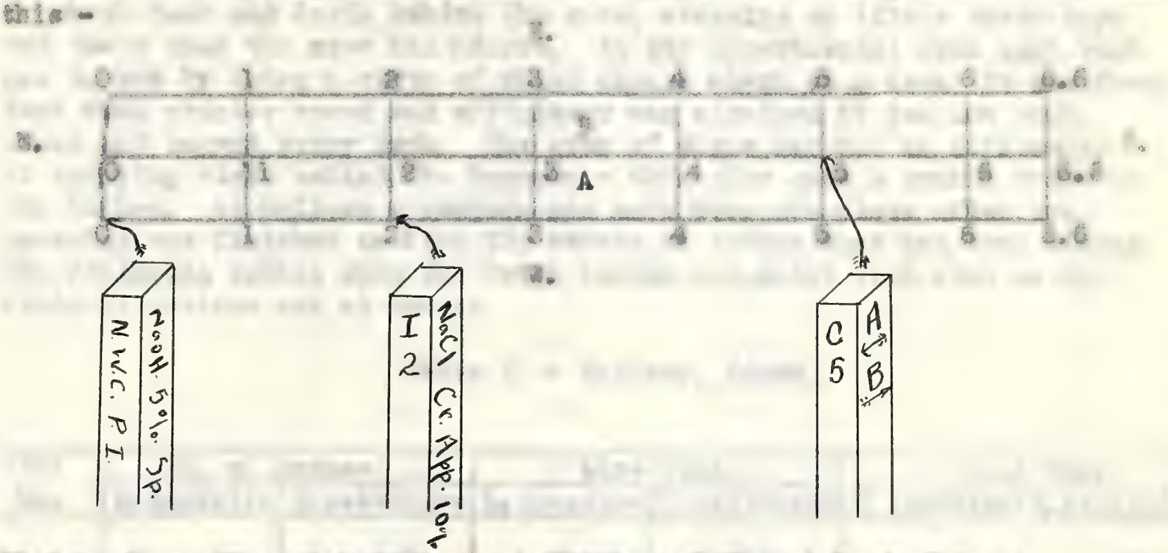
General statement: When the program of work for 1935 was outlined it was decided to [illegible] the general method of attack. After [illegible] it was agreed that the problem [illegible] take two parts: (a) the search for a chemical and (b) the application of that chemical under field conditions.

The summer field season lends itself to the study of application while during the winter [illegible] research work could be conducted on specific phases of the problem suggested by what we might almost call the [illegible] methods of the summer. With these ideas in view a somewhat more extensive application of individual chemicals which in previous work had showed the greatest promise was planned. The best method of attack, and the only one in fact that can be used under a great many conditions is that of spraying. Other means, such as soil, crown and root injections were of course to be given a fair trial, but attention was for the most part to be focused on spraying, with particular attention [illegible] to the possible [illegible] methods of chemical eradication. Some time was spent deciding on a suitable experimental location. For our purposes a spot [illegible] reached by transportation facilities was of course essential and a heavy concentration of Ribes that would give us a maximum field of experimentation over a relatively small area was also desirable. Lake Creek, about three miles out of Wallace, Idaho, was chosen as the first experimental location. [illegible] for the summer's work and on June [illegible] a crew of four [illegible] was on June [illegible] commenced work on this area. Experiments at Lake Creek were completed on July [illegible] and camp was moved to [illegible], Idaho, where an [illegible] desirable situation of *R. inerme* and *R. lacustre*, had been located. This area at [illegible] was [illegible], quite open and [illegible] in which *R. inerme* and *R. lacustre* grew profusely. This constituted different working conditions from those at Lake Creek – where experiments were conducted on *R. petiolare* and *R. lacustre*, representing [illegible], [illegible] from those *R. petiolare* [illegible]. [illegible] and data [illegible] were completed [illegible] on September [illegible] and the crew returned to Wallace to [illegible], finishing [illegible] on September [illegible].

Method of Laying out the Plots.

I – Wallace, Idaho. The creek and road parallel to it were first traversed and carefully mapped and three one acre plots were selected from the adjacent area. These plots and subsequent ones at [illegible] were laid out 66 ft. x 660 ft., in rectangular form by means of a [illegible] compass and a 100 ft. chain. [illegible] stations each 100 ft. long and one station of 60 ft. [illegible] the rectangular length of the plot. Each station was marked by means of a [illegible] 3 ft. long and about 2 inches square. [illegible]

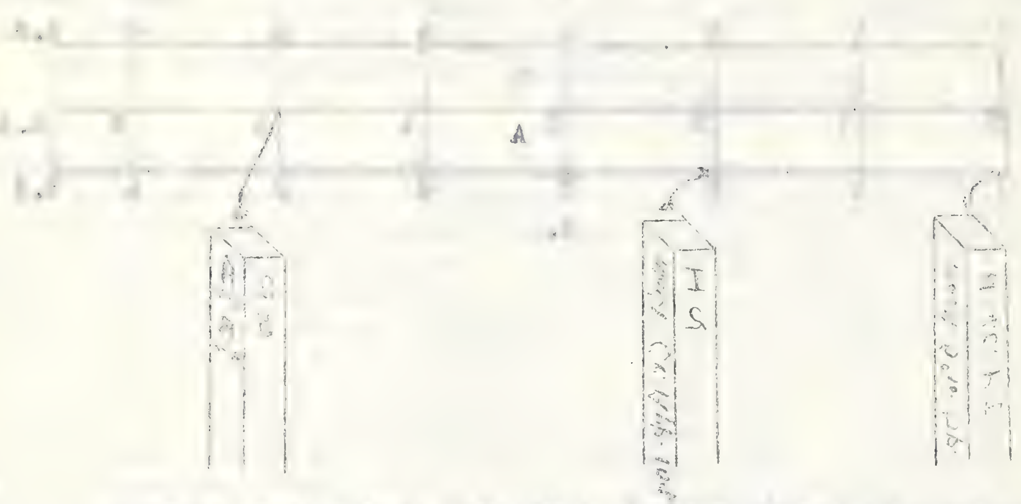
stake on each plot was tied into witness trees. A line of centre stakes divided each plot into two sections known hereafter as A and B - this made a total of 14 small experimental stations on each plot. Stakes were painted white and information regarding plot number, station number, chemical, concentration and method of application was lettered in black water proof paint on each stake. The following plan illustrates this -



Plot numbers are printed first at the top of the stake in Roman numerals and beneath, in Arabic numerals, is given the station number. This plan was adhered to throughout the course of the summer's work.

Data Taking.

Each plot was first covered in crew formation and Ribes data taken along two strips to the plot, called A and B. The average height, feet of live stem, and feet of dead stem of each bush was taken. At the first of the season test strips were run and then data retaken after the crew formation had been changed. Agreement was very fair considering the number of very large clumps of R. petiolare. At the end of the season data were taken over all sprayed plots using the same method of crew formation. This time the height, feet of defoliated stem, and percent of releaf on the basis of feet of defoliated stem were recorded. Where crown applications were made careful notes were taken regarding the final condition of the Ribes. The method of data taking by the crew was as follows. Four men, each provided with a 3 ft. measuring stick lined up in crew formation covering a total distance of 12 ft. The fifth man acted as recorder. Each crew man in turn would advance about 3 ft. on his line and give data, planting his stick beside the last bush taken, and then wait for the line to work up, before he again advanced. This was found to be the only workable method in view of the heavy concentration of Ribes.


A

S praying by Crew

This was most satisfactorily carried out by a crew of five men - four men in line at intervals of some 8 ft. each man carrying a $3\frac{1}{2}$ gallon tank sprayer of the compressed air type, and a foreman who carried a smaller sprayer of the same type, and whosebusiness it was to check back and forth behind the crew, cleaning up little spots here and there that the crew had missed. In our experimental work each bush was tagged by tying a strip of white cheese cloth on a stem; it was found that much greater speed and efficiency was attained if two men went ahead and tagged every bush. The crew of three men had no difficulty in spraying right behind the taggers - this also gave a double check on the bushes. At Wallace a recheck was made over the plots after the spraying was finished to find the number of bushes that had been missed. The following tables show the total bushes and total live stem on the plots at Wallace and at Santa:

Table I - Wallace, Idaho.

Plot No.	No. of Bushes		Live Stem		Dead Stem	
	R. lacustre	R. petiolare	R. lacustre	R. petiolare	R. lacustre	R. petiolare
I A	82	51	3308	18046	348	382
I B	82	51	1055	1944	50	35
II A	89	36	1169	10362	195	173
II B	177	57	792	5528	212	187
III A	70	17	681	5164	50	45
III B	49	19	519	3084	27	5
Check Plot		1-clump		5200		70
Totals	549	231	7524	49328	882	897

Table II - Santa, Idaho.

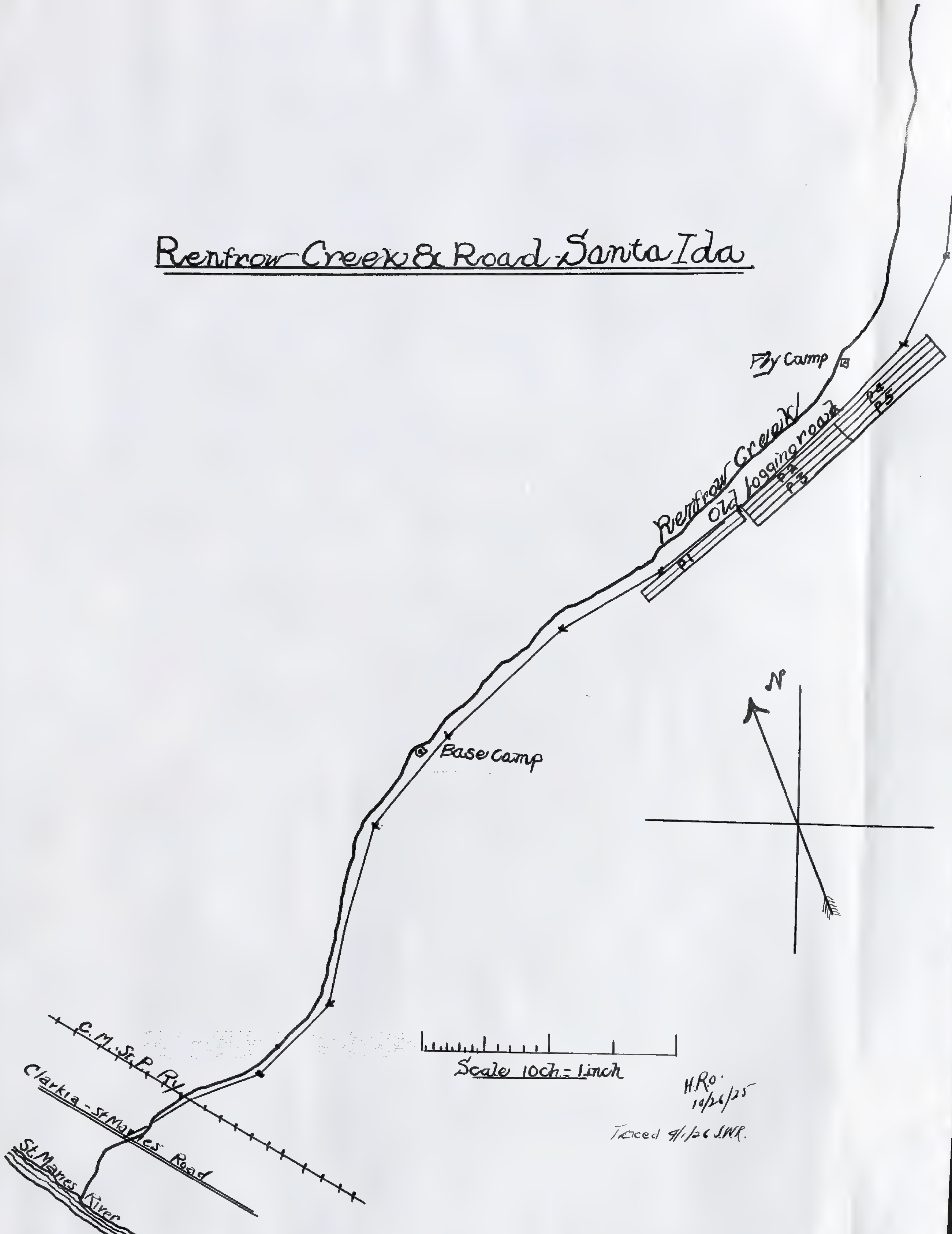
Plot No.		No. of Bushes		Live Stem		Dead Stem	
		R. lacustre	G. inermis	R. lacustre	G. inermis	R. lacustre	G. inermis
I	A	557	1203	12382	18564	2259	1935
I	B	799	892	8802	8265	1998	850
II	A	22	781	157	9894	22	666
II	B	16	650	165	9452	38	493
III	A	13	682	380	9929	47	285
III	B	41	674	727	8102	162	334
IV	A	3	349	50	5432	35	686
IV	B	5	452	173	6235	126	438
V	A	1	399	25	4987	3	544
V	B	0	388	0	4948	0	379
Totals		1457	6470	22861	85808	4690	6610

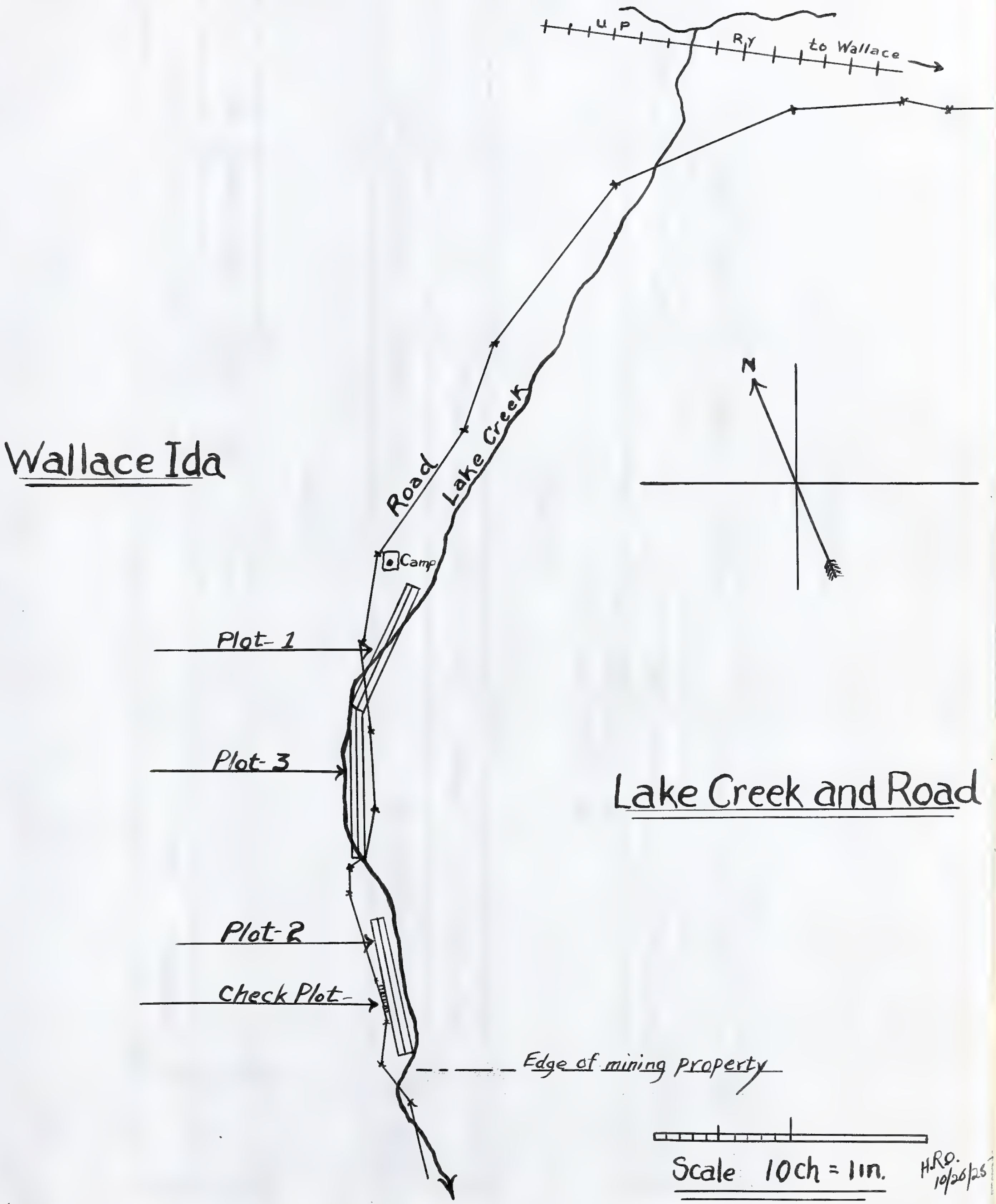
On the Wallace plots it was found that 40 bushes having 204 ft. of live stem and 6 ft. of dead stem had been missed. This gave a crew efficiency of 94.4% on bushes and 99.5% on live stem. Experiments of this kind were not repeated at Santa, Idaho. Precisely the same methods of laying out plots, data taking and crew spraying were used at Santa, Idaho, on the five plots located at that place.

Apparatus Used for Spraying

The sprayer used was of the familiar compressed air type. Two makes of sprayers were used during the course of the summer's work. The first one called "The Hudson" a sprayer made by the Hudson Mfg. Co., deterriorated rather rapidly owing to a leather relief valve upon which the more caustic chemicals acted and on account of a poor connection between the hose and tank, which broke off at frequent intervals and after soldering the first time it was impossible to keep the tank up to the proper pressure for good spraying. This sprayer retailed for $6.50. The second sprayer purchased "The Utility" made by the Albert Lea Spray Co., of Minneapolis, was much more satisfactory. Both of these objectionable features mentioned above, were eliminated in this patent, and all four sprayers of the last mentioned make were in good shape at the end of the season.

Renfrow Creek & Road-Santa Ida





Traced 9/1/26 J.W.R.

Wallace, Ida.

Plot 1

0 1 2 3 4 5 6 6.6

B	5	Gals. Atlas N.	P. - 100% -	S. 0-4	12 Gals. A. N.	P. 50% - S. 4 -	6.6
A	14 Gals. N	aF - 5% -S.0-3.	5	* ** Not	Sprayed	8 Gals. A.N.P.	50%S.5-6.6

* 6 Gals. $HgCl_2$ - 2%

** 3 Gals. NaBr - 10%

Plot II

0 1 2 3 4 5 6 6.6

B			20 Gals. Atla	s N. P. - 50%	Soln.	- S. 0 - 6.6	
A	16	Gals. NaOH -	1%-NaF - 5% -	S. 0- 4.25	15½ Gals	NaOH - 5% NaF -	5% S. 4.25-6.6

Plot III

0 1 2 3 4 5 6 6.6

B	10	Gals. NaBr -	10% - S.	0 - 6.			
A	12 Gals.	$Na_2B_4O_7$ - 10%	- S. 0 - 4.5		Not	Sprayed	

Santa, Idaho.

Plot I

	0	1	2	3	4	5	6 – 6.6
A	NaF + NaOH 13 G. - 4%	NaOH - 4% 12 G.	NaOH - 4% 15 G.	NaOH - 2% 13½ G.	NaF - 4% 16 G.	$Na_2B_4O_7$ - 5% 15 G.	NaBr - 8% 7½ G.
B	A.N.P. - 50% 11 G.	A.N.P. - 50% 14½ G.	A.N.P. -331/3% 18 G.	A.N.P. -331/3% 12 G.	A.N.P. -331/3% 15 G.	A.N.P. -331/3% 15 G.	NaBr + NaOH 4½ G.

Plot II

	0	1	2	3	4	5	6 – 6.6
A	NaOH-4% Sp.&S. 6 G.	Ca Cl_2 - Sp. 10% - 18 G.	$CaCl_2$ Cr.App. 10% 12G. ¦ NaCl- 10% 15 G.	NaCl - Sp. 3 G. - 20% 6 G. - 10%	NH_4Cl - Sp. 12½% - 8 G.	NaCl-20%-Cr.App 12 G. NaF-4%-Cr.App. 13 G.	NH_4Br-8% Sp. -1½G.
B	NaOH - 4% Sp. & S. 17 G.	NaOH - 4% Sp. & S. 13 G.	$CaOCl_2$ Cr.App. 10# ¦ NaOH-5% S. App. 15G.	NaOH-5% Cr.App. 15 G. ¦ Cr.App. NaF-5% 5 G.	Ex. Section S alt	Ex. Section Misc.Cr.App.	$Na_2B_4O_7$ Cr.App 4# ¦ 2G. ANP Cr. App.

Plot III

	0	1	2	3	4	5	6 – 6.6
A	NH_4Cl - 10% Sp. - 20 G.	NH_4Cl Sp. 20%-6G. ¦ $CaOCl_2$ 7# Dusted	Stripped Leaves by Hand	Ex. Section See Notes	NH_4C l - 10% Cr.App. 8 G.	$CaCl_2$ - Sp. 9	12% G.
B	A.N.P. - 20% Sp. - 12 G.	A.N.P. - 10% Sp. - 18 G.	A.N.P. - 50% Sp. - 10 G.	NH_4Br - 8% Sp.	Soln. 9 G.	NH_4Br 8% 9G. Cr.App ¦ $BaCl_2$-10% Cr.App. 9 G.	$BaCl_2$ 5% 3 G. Sp. ¦ A.S. 20G. K. 1G. Cr.App

Ex - Experimental
G. - Gallons
Cr.App. - Crown Application
S. - Soil

A.S. - Acid Sludge
Sp. - Spray
K. - Kerosene

Santa, Idaho.

Plot IV

	0–1	1–2	2–3	3–4	4–5	5–6	6–6.6
A	NH_4Cl - 10% Black Dye	Sp. 9 G.	NH_4Cl 4½ 9 G. Sp. ¦ NH_4 Sp.	Cl - 12½ % 9 G.	KF - 4% - 4½ G.	Soln. 4½ G.	NH_4Cl-1% 3 G. Sp.
B	NH_4Cl 4% $Na_2B_4O_7$ 7½ Cr	App. ¦ A.S. ¦ K. ¦ NH_4 9	Br-2½% G. ¦ NH_4Br 2½% 6 G.	$(NH_4)_2Cr_2O_7$-2% Cr.App. 6 G.	KF-4% Cr.App. 6 G. ¦ K. 1 G. Cr.App	K. 2 G. - Sp.	NH_4Cl-1% 3 G. Sp.

Plot V

	0–1	1–2	2–3	3–4	4–5	5–6	6–6.6
A	NH_4Cl - 10% Sp. - 6 G.	NH_4F - 4% 9 G. Sp.	NH_4F - 4% Cr. App. - 6 G.	NH_4Cl - 5% Sp. - 6 G.	NH_4NO_3 - 10% Sp. - 6 G.	NH_4NO_3 - 5 S p. - 6 G.	% + Soap
B	A.N.F. - 20% 20 G. - Cr.	App. ¦ NH_4NO_3-10% Sp. - 6 G.	Soap Sp. 6 G.	NH_4NO_3 - 10% Cr.App. - 6 G.	NH_4NO_3 20% 1½ G. Cr.App. ¦ $BaCl_2$ 5	- 20% - P. - 6	Soln. G.

Ex - Experimental.
G. - Gallons
Cr.App.-Crown Application
S. - Soil

A. S. - Acid Sludge
Sp. - Spray
K. - Kerosene

Experimental Detail of Plots at Santa and Wallace.

The following part of this report presents in detail the various experiments on chemical eradication of Ribes that were performed at Wallace, Idaho and Santa, Idaho. Data are given throughout, according to the legend shown below: these headings are self explanatory. In addition to the chemical experiments, some time was spent in making root studies of G. inermis and R. lacustre in relation to crown and soil applications of chemicals. The purpose was to find a correlation between feet of live stem, type of bush and manner of distribution of the roots. After working over the material no definite factors appeared, but it was found that in the particular location at Santa where the work was performed G. inermis had quite an appreciable tap root in dry situations while in the moist spots the root system roughly paralleled the surface of the ground at about an average depth of 6 inches. The root distribution of R. lacustre was similar to that of the moist type of G. inermis. A number of experiments that were performed outside of the plot boundaries or on a relatively small scale inside of the staked out areas, have been gathered together and placed in a supplementary list in this section of the report. All the data regarding each separate experiment are presented in the following form:

Location
  Plot No.
    1. No. of each species of Ribes.
    2. Date of application - amount of chemical used and method of application.
    3. Chemical used and concentration.
    4. Weather.
    5. Notes.
    6. Results.

Wallace, Idaho.
  Plot - 1, (0.00-3.50) A.
    1. R. petiolare - 7 clumps - average 7ft. x 4 ft. R. lacustre 45.
    2. June 30th A.M., 14 gals. Spray.
    3. NaF - 5%.
    4. Fine - warm - clear.
    5. Ground very soft and marshy - both shade and open types of bushes.
    6. Defoliation 50% - no dead stem, no apparent defoliation.

"
  Plot - I, (3.50-3.60) A.
    1. R. petiolare, 1 clump 33 x 10.
    2. June 30, P.M., 6 gals. Spray.
    3. $HgCl_2$ - 1%.
    4. Fine - warm - clear.
    5. Leaves of R. petiolare turned brown within a few hours of spraying.
    6. Defoliation 25% - no releaf.

Wallace, Idaho,

Plot I - (3.50-s.75) A.

1. R. petiolare - 1 clump - 22 x 5.
2. July 3, P.M. 3 Gals. Spray.
3. NaBr - 10%.
4. Fine - warm - clear.
5. Spray did not stick to leaves very well. Action of chemical slow.
6. Defoliation 20%. No other effect.

"

Plot I - (3.75-5.00)

Not sprayed

"

Plot I - (5.00-6.60) A.

1. R. petiolare 15, clumps - 2, 3 x 12 and 5 x 5. R. lacustre 32.
2. July 1, p m., 6 gals. Spray.
3. Atlas N. P. Weed Killer - 50%.
4. Fine - warm - clear.
5. Action of weed killer fairly slow takes from 7 - 10 days to defoliatebushes.
6. About 90% of stem killed - releafing on a few R. lacustre.

"

Plot I - (0.00-4.00) B.

1. R. petiolare 41, R. lacustre 62.
2. July 1, A.M. 5 gals. Spray.
3. Atlas N. P. 100%.
4. Fine - warm - clear.
5. This spray spreads over leaf surface evenly.
6. Complete defoliation, R. petiolare stem killed down to ground. Several roots that were examined were found to be in process of decay. A few R. lacustre seem to be sending up new shoots.

"

Plot I - (4.00-6.60) B.

1. R. petiolare 47, R. lacustre 45.
2. July 2, A.M. 12 Gals. Spray.
3. Atlas N. P. - 50%.
4. Fine - warm - clear.
5. As above.
6. Dead stem and defoliation same as previous experiment.

Wallace, Idaho

Plot II - (0.00-4.25) A.

1. R. petiolare 42, 4 clumps 12 x 14, 8 x 8, 6 x 14, 10 x 8, R. lacustre, 57.
2. June 25, A.M. 16 gals. Spray.
3. NaF - 5% + NaOH - 1%.
4. Fine - warm - clear.
5. Spray spreads evenly. Action slow.
6. R. lacustre less resistant than R. petiolare, particularly shade types of R. lacustre. No complete kills and defoliation 40%.

" Plot II - (4.25-0.60) A.

1. R. petiolare 36 - 5 clumps 12 x 18, 8 x 12, 16 x 20, 8 x 5, 6 x 6. R. lacustre 65.
2. June 25, P.M. 15½ gals.
3. NaF - 5% + NaOH 5%.
4. Fine - warm - clear.
5. Action rapid due to caustic. Leaves turned brown in an hour.
6. R. petiolare completely defoliated and completely releafed. Some shade type of R. lacustre has considerable stem killed. Defoliation 50%.

" Plot III - (0.00-4.50) A.

1. R. petiolare 2 clumps, 40 x 20, 50 x 35. R. lacustre 40.
2. July 2, A.M. 12 gals. Spray.
3. $Na_2B_4O_7$ - 10%.
4. Fine - warm - clear.
5. Chemical sticks to bushes very well. Shows up white and is a good marker.
6. R. lacustre completely defoliated with 40% releaf. R. petiolare 10% defoliation.

" Plot III - (4.50-6.60)

Not sprayed.

" Plot III - (0.00-6.00) B.

1. R. petiolare 14, 3 clumps 15 x 15, 5 x 5. 18 x 8.
2. July 3, A.M. 10 gals. Spray.
3. NaBr - 10%.
4. Fine - warm - clear.
5. Action slow. Slight leaf curl after spraying.
6. Defoliation 20%. No other apparent effect.

Wallace, Idaho

Plot III - (6.00-6.60)

Not sprayed.

Santa, Idaho

Plot I - (0.00-1.00) A.

1. G. inermis 195. R. lacustre 110
2. July 17, A.M., P.M. 13 gals. Spray.
3. NaF - 4% + NaOH 2%.
4. Warm and somewhat cloudy in A.M. Warm breeze and more clouds in P.M.
5. Action slow, spray spreads and sticks well.
6. Bushes not entirely defoliated and releafing. 1925 stem growth killed in many cases.

"

Plot I - (1.00-3.00) A.

1. G. inermis 522. R. lacustre 199.
2. July 18, A.M., P.M. July 19, A.M., P.M. 27 gals. Spray.
3. NaOH - 4%.
4. Fine - warm - clear.
5. Action rapid on leaves which turned color in few hours.
6. Defoliation 100% with considerable releaf. Small amount 1925 stem growth killed.

"

Plot I - (3.00-4.00) A.

1. G. inermis 107. R. lacustre 112.
2. July 20, A.M., P.M. 13½ gals. Spray.
3. NaOH 2%.
4. Fine - warm - clear.
5. Action considerably slower than 4% solution.
6. Defoliation complete. More releaf than 4% solution.

"

Plot I - (4.00-5.00) A.

1. G. inermis 96. R. lacustre 84.
2. July 21, A.M. July 22 P.M. 16 gals. Spray.
3. NaF - 4%.
4. Cloudy but warm on 21 and fine and warm with few clouds on 22.
5. Action slow. Solid crystals stayed on leaves after evaporation, of solvent for eight or ten days.
6. Defoliation 70%. Very little releaf over defoliated portions.

Sante, Idaho,

Plot I - (5.00-6.00) A.

1. *G. inermis* 183. *R. lacustre* 43.
2. July 21, P.M. 15 gals. Spray.
3. $Na_2B_4O_7$ - 8%.
4. Cloudy but warm.
5. Spray sticks well, good marker. Slow action.
6. Leaves brown at edge - very slight defoliation. No other effect.

"

Plot I - (0.00-2.00) B.

1. *G. inermis* 144, *R. lacustre* 355, *R. petiolare* 1.
2. July 23, A.M., P.M. 25½ gals. Spray.
3. A.N.P. - 50%.
4. Fine - warm - clear.
5. Action slow. Spray spreads and sticks well.
6. A few small bushes dead, defoliation complete. 20% of live stem killed releaf small and only on *R. lacustre*.

"

Plot I - (2.00-6.00) B.

1. *G. inermis* 587, *R. lacustre* 424.
2. July 24, A.M. (S.2-3) 18 gals. July 31 & 30, A.M., P.M. (S.3-6) 42 gals. Spray.
3. A.N.P. 33-1/3%.
4. July 24 and 30, fine - warm - clear. July 31, cloudy with few drops of rain in afternoon, warm.
5. As above.
6. Small plants dead, defoliation complete, small percentage of releaf. Death of live stem 20%.

"

Plot I - (6.00-6.60) B.

1. *G. inermis* 61. *R. lacustre* 20.
2. July 22, P.M. 4½ gals. Spray.
3. NaBr 8%, NaOH 2%.
4. Fine - warm - clear.
5. Defoliation takes place after one or two days.
6. Defoliation 80%. Most of defoliated stem releafing. No dead stem.

Santa, Idaho,

Plot II - (0.00-0.50) A.

1. *G. inermis* 99. *R. lacustre* 7.
2. July 27th, A.M. 6 gals. Spray and soil.
3. NaOH - 4%.
4. Fine - warm - clear.
5. Chemical was applied to ground about bases of plant as well as the usual spray. Leaves blackened in a few hours.
6. Complete defoliation, Extensive releaf taking place. No dead stem.

"

Plot II - (0.50-2.00) A.

1. *G. inermis* 256. *R. lacustre* 4.
2. Aug. 3, A.M. 18 gals. Spray.
3. $CaCl_2$ - 10%.
4. Fine - warm - clear.
5. Holds moisture for several days on leaves and sticks very well. Action slow. Red dye.
6. Leaves turned brown prematurely. No marked effect.

"

Plot II - (2.00-2.50) A.

1. *G. inermis* 95. *R. lacustre* 1.
2. Aug. 3, P.M. 12 gals. Cr. App.
3. $Cacl_2$ - 10%.
4. Fine - warm - clear.
5. Red dye used and bushes tagged with red cheese cloth. Action slow.
6. No marked defoliation, no dead stem. Leaves turned red and brown prematurely.

"

Plot II - (2.50-3.00) A.

1. *G. inermis* 95. *R. lacustre* 2.
2. Aug. 10, A.M. 15 gals. Spray.
3. NaCl - 10%.
4. Fine, warm, becoming somewhat smoky.
5. Green dye used. Action slow.
6. Defoliation 20%. No releaf of defoliated stem. No dead stem.

Santa, Idaho,

Plot II - (3.00-4.00) A.

1. G. inermis, 90. R. lacustre 3.
2. Aug. 9, P.M. 9 Gals. Spray.
3. NaCl - 20%.
4. Warm, smoke from forest fires cooling off heat of sun during day.
5. Blue dye.
6. Defoliation 30%. No dead stem.

"

Plot II - (4.00-5.00) A.

1. G. inermis 87. R. lacustre 4.
2. July 17, P.M. 8 gals. Spray.
3. NH_4Cl - 12½ %.
4. Fine, warm, P.M. somewhat cloudy.
5. Spray spreads and sticks.
6. Defoliation complete. No releaf, 1925 stem growth dead. About 10% of older wood was also killed.

"

Plot II - (5.00-5.50) A.

1. G. inermis 36.
2. Aug. 10, A.M. 12 gals. Gr. app.
3. NaF - 4%.
4. Fine, warm, (Smoky).
5. Red dye.
6. Bushes not noticeably effected, except that autumnal changes seem to be hastened.

"

Plot II - (5.50-6.00) A.

1. G. inermis 36. R. lacustre 1.
2. Aug. 11, P.M. 15 gals. Gr. app.
3. NaCl - 20%.
4. Fine - warm - smoky.
5. No immediate effect.
6. Bushes uneffected; all foliage green and abundant.

"

Plot II - (6.00-6.50) A.

1. G. inermis 30. R. lacustre 1.
2. Aug. 5, 1½ gals. Spray.
3. NH_4Br - 8%.
4. Fine - warm - clear.
5. Action slow and similar to NH_4Cl.
6. Defoliation 40%. No releaf and no dead stem.

Santa, Idaho,

Plot II - (2.50-3.00) B.

1. G. inermis 84.
2. July 25, P.M. 15 gals. Soil app.
3. NaOH - 5%.
4. Hot in A.M. Cloudy with wind and a little rain in P.M.
5. Ground around base of each plant was soaked with chemical.
6. Bushes uneffected with no sign of unnatural defoliation or dead stem.

Plot II - (3.00-3.25) B.

1. G. inermis 30.
2. July 24, P.M. 5 gals. Cr. app.
3. NaF - 5%.
4. Fine and clear in A.M. Cloudy and warmer in P.M.
5. One crown application made on each bush. No immediate effects.
6. No defoliation or apparent effect.

Plot II - (3.25-4.00) B.

1. G. inermis 30.
2. July 25, A.M. 15 gals. Cr. app.
3. NaOH - 5%.
4. Fine and hot in A.M. Cloudy with little rain in P.M.
5. No effect noticed.
6. No apparent effect.

Plot II - (4.00-5.00) B.

1. G. inermis 45. R. lacustre 4.
2. July 15, P.M. 50# solid. In cr. and soil app.
3. NaCl, Solid.
4. Fine - warm - clear.
5. See supplementary experiments at end of this section.

Plot II - (5.00-6.00) B.

1. G. inermis 57.
2. July 16, A.M., July 17 P.M. Cr. app.
3. 4.56, see supplementary section.

Plot II - (6.00-6.40) B.

1. G. inermis 27.
2. July 21, P.M. 10# cr. app.
3. $Na_2B_4O_7$ - solid.
4. Cloudy but warm.
5. No immediate effect.
6. No apparent effect.

Santa, Idaho,

Plot II - (6.40-6.60) B.

1. G. inermis 8.
2. July 23. 2 gals. Cr. app.
3. A.N.P. 100%.
4. Fine, warm, clear.
5. Action slow. Bushes commenced to turn color in about five days.
6. Defoliation complete, 50% of stem killed. A few smaller bushes dead.

" Plot III - (0.00-1.00) A.

1. G. inermis 177. R. lacustre 6. R. petiolare 1.
2. Aug. 5, A.M. 20 gals. Spray.
3. NH_4Cl - 10%.
4. Fine, warm, clear.
5. Action fairly slow. Defoliation commenced after 5-7 days.
6. Defoliation 90% - no releaf. Some 1925 stem killed.

" Plot III - (1.00-1.50) A.

1. G. inermis 70. R. lacustre 1.
2. Aug. 28, P.M. 6 gals. Spray.
3. NH_4Cl - 20%.
4. Cloudy and cool.
5. Action begins after 3-4 days.
6. Defoliation complete - no releaf. All 1925 stem lifeless.

" Plot III - (1.50-2.00) A.

1. G. inermis 68. R. lacustre 2.
2. Aug. 31, P.M. 7#.
3. CaCl(OCl) - solid.
4. Warm, cloudy with sun at intervals.
5. Bushes were first sprayed with water and then the solid dusted over the leaves.
6. Slight burning effect on leaves.

" Plot III - (2.00-3.00) A.

1. G. inermis 165. R. lacustre 3.
2. Aug. 7, A.M., P.M.
4. Fine - warm - clear.
5. Leaves stripped from bushes by hand.
6. About 5% new leaves - large number of new leaf buds have appeared. No dead stem

Sante, Idaho,

Plot III - (3.00-4.00) A.
1. _G._ _inermis_ 60.
2. Aug. 4, Misc. Cr. App.
3. 4,5,6, supplementary section.

" Plot III - (4.00-5.00) A.
1. _G._ _inermis_ 65. _R._ _lacustre_ 1.
2. Aug. 6. 8 gals. Cr. App.
3. NH_4Cl - 10%.
4. Fine - warm - clear.
5. No immediateeffects.
6. Defoliation 10%. No other effect.

" Plot III - (5.00-6.60) A.
1. _G._ _inermis_ 77.
2. Aug. 11, A.M. 9 gals. Spray.
3. $CaCl_2$- 12%.
4. Fine - warm - clear.
5. Leaves turned brown prematurely no marked effect outside of a little defoliation.

" Plot III - (0.00-1.00) B.
1. _G._ _inermis_ 145. _R._ _lacustre_ 25.
2. Aug. 28, A.M. 12 gals. Spray.
3. A.N.P. - 20%.
4. Cloudy and cool.
5. Action slow.
6. Defoliation complete. No releaf - 15% of 1925 stem killed.

" Plot III - (1.00-2.00) B.
1. _G._ _inermis_ 132. _R._ _lacustre_ 11.
2. Aug. 29, P.M. 13 gals. Spray.
3. A.N.P. 10%.
4. Fine, cool, clear.
5. As above.
6. Complete defoliation 10%. of stem killed. No releaf.

" Plot III - (2.00-3.00) B.
1. _G._ _inermis_ 154.
2. Aug. 30, P.M. 10 gals. Spray.
3. A.N.P. - 50%.
4. Fine - cool - clear.
5. As above.
6. Defoliation complete - all 1925 stem killed, considerable lowering of vitality of plant.

Santa, Idaho,

Plot III - (3.00-5.00) B.

1. G. inermis 121. R. lacustre 4.
2. Aug. 11, P.M. 9 gals. Spray.
3. NH_4Br 8%.
4. Fine - warm - clear.
5. Spreads and sticks well. Action slow.
6. Defoliation 40%. No releaf and no dead stem.

" Plot III - (5.00-5.50) B.

1. G. inermis 36.
2. Aug. 11, P.M. 9 gals. Cr. app.
3. NH_4Br - 8%.
4. Fine - warm - clear.
5. Blue dye used as an indicator.
6. Slight defoliation, plants otherwise vigorous.

" Plot III - (5.50-6.00) B.

1. G. inermis 36.
2. Aug. 27, P.M. 9 gals. Cr. app.
3. $BaCl_2$ 10%.
4. Slight shower in A.M. Coolin P.M. Clearer in late afternoon.
5. No effect.
6. No defoliation, bushes vigorous.

" Plot III - (6.00-6.30) B.

1. G. inermis 27. R. lacustre 1.
2. Aug. 27, P.M. 3 gals. Spray.
3. $BaCl_2$ 8%.
4. Cool and clear in late afternoon.
5. No immediate effect.
6. Defoliation 10% - no other effect.

" Plot III - (6.30-6.60) B.

1. G. inermis 26.
2. 3, 4, 5, 6, see supplementary section.

" Plot IV -(0.00-2.00)A.

1. G. inermis 91. R. lacustre 1.
2. Aug. 13, P.M. 9 gals. Spray.
3. NH_4Cl - 10%.
4. Cool and cloudy - rained 8:30 - 11:00 in morning. Clear and warm in afternoon. Rained heavily during night.
5. Black dye used as indicator. Sprayed about three hours after heavy rain. While spraying a little rain fell.
6. Defoliation nearly complete. No releaf and some 1925 stem killed

Santa, Idaho,

Plot IV - (2.00-2.50) A.

1. G. inermis 52.
2. Aug. 15, P.M. 9 gals. Spray.
3. NH_4Cl - 4%.
4. Cold, cloudy with two showers during morning.
5. Soap used as a sticker. Spray shows up well on bushes.
6. Defoliation 75%. No other effect.

" Plot IV - (2.50-4.00) A.

1. G. inermis 109.
2. Aug. 17, A.M. 9 gals. Spray.
3. NH_4Cl - 12½%.
4. Foggy until 8:00 A.M. then bright and warm.
5. No dye or sticker used. Action slow.
6. Defoliation complete. No releaf. 1925 stem growth dead. About 10% of older wood also killed.

" Plot IV - (4.00-6.00) A.

1. G. inermis 91.
2. Aug. 18, P.M. 9 gals. Spray.
3. KF - 4%.
4. Fine - warm - clear.
5. Action slow.
6. Defoliation complete. No releaf and 20% of 1925 stem growth killed.

" Plot IV - (6.00-6.60) A.

1. G. inermis 58. R. lacustre 2.
2. Aug. 19, A.M. 3 gals. Spray.
3. NH_4Cl - 1%.
4. Fine - warm - clear.
5. Soap used as a sticker.
6. Very little defoliation no other effects noticed.

" Plot IV - (0.00-0.80) B.

1. G. inermis 48.
2. Aug. 15, P.M. 12#. Cr. app.
3. NH_4Cl - Solid.
4. Cold and cloudy with showers in A.M.
5. Solid finely pulverized.
6. Defoliation 10%. No other effect.

Santa, Idaho,

Plot IV - (0.80-1.20) B.

1. G. inermis 34. R. lacustre 8.
2. Aug. 15, P.M. 7#. Cr. app.
3. $Na_2B_4O_7$ Solid.
4. As above.
5. About 85 gms. applied to each bush.
6. No apparent effect.

" Plot IV - (1.20-1.70) B.

1. See supplementary notes.

" Plot IV - (1.70-3.00) B.

1. G. inermis 113.
2. Aug. 17, P.M. 15 gals. Spray.
3. NH_4Br - 2½%.
4. Foggy in morning till 8:00 afternoon clear and warm.
5. Soap used as a sticker.
6. Defoliation 20% otherwise plants still vigorous.

" Plot IV - (3.00-4.00) B.

1. G. inermis 31.
2. Aug. 17, A.M. 6 gals. Cr. app.
3. $(NH_4)_2Cr_2O_7$ - 2%.
4. As above.
5. Spray is colored itself and shows up on bushes very well.
6. Defoliation complete - no releaf, no dead stem.

" Plot IV - (4.00-4.50) B.

1. G. inermis 22.
2. Aug. 18, P.M. 6 gals. Cr. app.
3. KF - 4%.
4. Fine, warm, clear.
5. Action slow.
6. Few smaller plants have been killed. Defoliation complete, no releaf.

" Plot IV - (4.50-5.00) B.

1. G. inermis 12.
2. Aug. 19, P.M. 1 gal. Cr. app.
3. Kerosene 100%.
4. Fine, warm, clear.
5. Each bush treated with about 1 pt. of oil.
6. No effect, all bushes vigorous.

Santa, Idaho,

Plot IV - (5.00-6.00) B.

1. G. inermis 46. R. lacustre 3.
2. Aug. 19, P.M. 2 gals. Spray.
3. Kerosene - 100%.
4. Fine - warm - clear.
5. Oil spreads nicely over leaf surface.
6. Slight burning effect on leaf. No other injury noted.

" Plot IV - (6.00-6.60) B.

1. G. inermis 68.
2. Aug. 19, A.M. 3 gals. Spray.
3. NH_4Cl - 1%.
4. Fine - warm - clear.
5. Soap used as a sticker.
6. Very little defoliation. No other effects noted.

" Plot V - (0.00-1.00) A.

1. G. inermis 93.
2. Aug. 20, A.M. 6 gals. Spray.
3. NH_4Cl - 10%.
4. Fine - warm - clear.
5. Soap used as sticker.
6. Defoliation complete. No releaf, about 10% dead stem.

" Plot V - (1.00-2.00) A.

1. G. inermis 56.
2. Aug. 20, P.M. 9 gals. Spray.
3. NH_4F - 4%.
4. Fine - warm - clear.
5. Action slow.
6. Defoliation complete. 1925 stem killed in many cases. No releaf.

" Plot V - (2.00-2.85) A.

1. G. inermis 35.
2. Aug. 20, P.M. 6 gals. Cr. app.
3. NH_4F - 4%.
4. Fine - warm - clear.
5. Action slow.
6. Few small bushes are apparently dying. 25% defoliation on larger bushes. No releaf.

Santa, Idaho,

Plot V - (2.85 - 4.00) A.

1. G. inermis 62.
2. Aug. 21, P.M. 6 gals. Spray.
3. NH_4Cl - 5%.
4. Fine, warm, clear.
5. Soap used as sticker. Action slow.
6. Defoliation 50%. Very little 1925 stem killed.

" Plot V - (4.00-5.00) A.

1. G. inermis 45.
2. Aug. 22, A.M. 6 gals. Spray.
3. NH_4NO_3- 10%.
4. Cloudy with slight rain in P.M.
5. Spray sticks and spreads well. Action slow. Soap used as sticker.
6. Defoliation 40%. No releaf, plants vigorous.

" Plot V - (5.00-6.60) A.

1. G. inermis 77.
2. Aug. 22, P.M. 6 gals. Spray.
3. NH_4NO_3 - 5%.
4. As above.
5. Soap used as sticker.
6. Defoliation 30%. No releaf, no dead stem.

" Plot V - (0.00-1.30) B.

1. G. inermis 112.
2. Aug. 24 and 25. P.M. and A.M. 20 gals. Cr.app.
3. A.N.P. - 20%.
4. Cloudy and cool on 24th. Fine warm clear on 25th.
5. No immediate effect.
6. No complete kills. Defoliation 100%. 1925 stem killed.

" Plot V - (1.30-2.00) B.

1. G. inermis 70.
2. Aug. 25, P.M. 6 gals. Spray.
3. NH_4NO_3 - 10%.
4. Fine, warm, clear.
5. Soap used as sticker.
6. Defoliation 40%. No releaf and no dead stem.

Santa, Idaho,

Plot V - (2.00-3.00) B.

1. G. inermis 98.
2. Aug. 25, A.M. 6 gals. Spray.
3. Soap 5%.
4. Fine, warm, clear.
5. Shows up quite white on bushes and stays for several days.
6. No effect.

" Plot V - (3.00-4.40) B.

1. G. inermis 47.
2. Aug. 22, P.M. Aug. 26 A.M. 6 gals. Cr. app.
3. NH_4NO_3 - 10%.
4. Cloudy with light rain on 22nd. Fine warm and clear on 26.
5. No immediate effects noted.
6. No apparent effect.

" Plot V - (4.40-6.60) B.

1. G. inermis 62.
2. Aug. 26, P.M. 6 gals. Spray.
3. $BaCl_2$ - 20%.
4. Fine, warm, and clear with rain following early morning.
5. No immediate effect.
6. A few small bushes killed. Large bushes completely defoliated although releaf is taking place.

Supplementary list of Experiments

Wallace, Idaho,

1. Check plot: consisting of several large clumps of R. petiolare adjoining Plot II. This area was sprayed with $HgCl_2$ - 10% - 10 gals. Defoliation was complete but the bushes were in full leaf about three weeks later and apparently as vigorous as ever.
2. On September 17, Plot III (0-1) A., previously sprayed with $Na_2B_4O_7$ was resprayed with 5 gals. NH_4Cl - 20% - also Plot II (4.25-6) A. was resprayed with its original chemical, namely, NaOH 5% + NaF 5%. Similar sections were left with only the original treatment, the object of this being to make a comparison next spring of the vigor of the plants on the respective areas. On Sept. 18 Plot III (1-1.25) A previously sprayed with $Na_2B_4O_7$ was resprayed with NaOH - 10%.

Santa, Idaho,

1. Experimental section Plot II (4-5) B. Salt in solid form was applied to a number of bushes in various quantities and in various ways. 6 bushes had a trench about 6" deep dug around them, and salt packed in this trench. Dirt was then thrown over the chemical. 5 bushes were given soil treatments. 35 had crown applications, and 5 bushes were given both crown and soil application. Considerable trouble was experienced with cattle prowling around in search of salt and for that reason it is difficult to definitely lay the death of a bush against the salt or the cattle. About 75% of the above bushes were completely dead at end of the season. Some bushes were scarcely effected.

2. Experimental section Plot II (5-6) B. Crown applications 57.
   (a) 11 bushes treated with NaOH 4% + NaF 5%. Each bush received approximately one quart of liquid. All bushes killed.
   (b) 7 bushes treated with NH_4Cl. Saturated solution one quart per bush. All bushes killed.
   (c) 14 bushes treated with NaCl solid 2# per plot. 5 bushes are thriving while the other 9 show no signs of life.
   (d) 32 bushes treated with solid NaOH from 1/2# - 1# of chemical used per bush. No definite defoliation took place and no kills.

3. Experimental section Plot III (3-4) A. Cr. app. on 45 G. inermis.
   (a) Experiments.

$CaCl_2$	2 bushes	2 Cr. app. each 100 gms.
	2 bushes	200 gms. each on soil.
	2 bushes	2 Cr. app. 100 gm. + 1 pt. 50% soln. + red dye.
	2 bushes	2 Cr. app. + 1 pt. 5% soln. + red dye.
$(NH_4)_2Cr_2O_7$	2 bushes	2 Cr. app. + 1 pt. of 5% soln.
NH_4Cl	2 bushes	4 Cr. app. 400 gms. each plant.
	2 bushes	2 Cr. app. 100 gms. each plant.
	2 bushes	2 Cr. app. 100 gms. each plant.
	2 bushes	2 Cr. app. 50 gms. each plant.
	2 bushes	Soil app. 200 gms. on each.
	2 bushes	200 gms. under sod on each bush
NH_4Cl + NaOH	2 bushes	2 Cr. app. 50 gms. NH_4Cl + 10 gm. NaOH.
	2 bushes	2 Cr. app. 100 gms. NH_4Cl + 25 gm. NaOH.

$NH_4Cl + (NH_4)_2Cr_2O_7$ - 2 bushes - 2 Cr. app. 1 pt. of 25% of each to bushes.

(b) Observations.

$CaCl_2$- 20% defoliation. No stem killed

$(NH_4)_2Cr_2O_7$- Complete defoliation. Stems all alive.

NH_4Cl- Complete defoliation. 1925 stem is dead.

NH_4Cl + NaOH- Complete defoliation. Some 1925 stem is dead.

$NH_4Cl + (NH_4)_2Cr_2O_7$-Defoliation 50%. No dead stem.

4. Experimental section Plot III (6.3 - 6.60) B.

(a) 1. G. inermis 12.
2. Aug. 9 P.M. 3/4 gal. Cr. app.
3. Acid sludge.
4. Fine, warm, clear.
5. Sludge poured into a small hole made in ground at base of plant.
6. Plants completely defoliated and stems are apparently dying.

(b) 1. G. inermis 14.
2. Aug. 9 P.M. 1 gal. Cr. app.
3. Kerosene.
4. Fine, warm, clear.
5. As above.
6. No effect - plants vigorous.

5. Experimental section Plot IV (1.00-1.70) B.

(a) 1. G. inermis 12.
2. Aug. 15, P.M. 1/2 gal. Cr. app.
3. Acid sludge 50%, kerosene 50%.
4. Cold and cloudy with two showers in A.M.
5. Acid sludge and kerosene 1/2 pt. of each were mixed. They are not miscible and separated into two layers.
6. Defoliation 10% - no dead stem.

(b) 1. G. inermis 10.
2. Aug. 15 P.M. 1/2 gal. Cr. app.
3. Acid sludge 50% water 50%.
4. As above.
5. Sludge is diluted by water.
6. Defoliation complete 50% dead stem and 3 small bushes dead.

6. Three large bushes 150 feet south of Plot I on little knoll each bush tagged with cheese cloth and paper tag.

Aug. 8 1 - Two stems cut and then bent down so that the stems were dipping into a small can containing cardinal/red dye. No leaves come in contact with dye. After three months stems showed no trace of dye even at tip.

Aug. 8. 2 - A root of a different plant was also placed in a similar solution-after three months root showed trace of color 3" from end which was placed in dye.

" 8. 3 - Leaves on 1925 stem placed in contact with the indicator. After three months, 1925 stem showed 8% of red stain.

7. Plot I (1-2) A.
   1. G. inermis 230. R. lacustre 97.
   2. Sept. 6, A.M. Sept. 7, P.M. 27 gals. Spray.
   3. NaOH - 4% (Resprayed).
   4. Cloudy cool and unsettled with showers.
   5. Light showers immediately after spraying in each case.
   6. Experiment performed to compare vitality of this resprayed section with that of single application.

8. Various combinations of sprays and crown applications of NH_4Br, NaF, $(NH_4)_2Cr_2O_7$ were made on bushes outside and adjoining plot V. Details are as follows. Numbers refer to a single bush in each case.

(1)	NH_4Br	- Spray	)90% defoliation, no dead
	$(NH_4)_2Cr_2O_7$	- "	) stem, no releaf.
(2)	NaF	- "	) Defoliation 100%, no releaf.
	NH_4Br	- "	) 1925 stem seems to be dying.
(3)	NaF	- "	) Defoliation 80%, no releaf,
	$(NH_4)_2Cr_2O_7$	- "	) no dead stem.
(4)	NaF	- "	) Defoliation 95%, no releaf,
	NH_4Br	- "	) 1925 stem killed.
	$(NH_4)_2Cr_2O_7$	- "	)
(5)	NH_4Br	- "	) Defoliation 100%, no releaf.
	$(NH_4)_2Cr_2O_7$	- Cr. app.	) No dead stem.
(6)	NH_4Br	- "	) Defoliation 90%, no releaf.
	$(NH_4)_2Cr_2O_7$	- Spray	) No dead stem.
(7)	NH_4Br	- "	) Defoliation 100%, 1925 stem
	NaF	- Cr. app.	) dying, no releaf.

(8) NaF - Spray) Defoliation 100%, 10%
NH_4Br - Cr. app.) dead stem, no releaf.

(9) NaF - ") Defoliation 20%, no other
$(NH_4)_2Cr_2O_7$ - ") effect.

(10) NH_4Br - Cr. app.) No apparent effect.
$(NH_4)_2Cr_2O_7$ - ")

The above experiments were performed Aug. 29, P.M. Weather was fine, warm, and clear. Data were taken on the bushes October 7. Actual precipitation of a chemical on the leaves took place in many of the above instances and remained on the bushes for several weeks.

9. Six small pine trees ranging from 10-15 years were sprayed with 10% solution, of NH_4Cl. This chemical causes complete defoliation of Ribes, but after 45 days there was no visible effect produced on the pines. About 5% of its needles were dead but this was also noticed on healthy untreated pine in the vicinity.

Notes:

A strong soap solution was added to chemical to act as a sticker. This made the spray spread over the leaf surface instead of forming small drops and falling on the ground.

(1) A.N.P. - Atlas Non Poisonous. This compound is a patent weed killer which gave very good results.

(2) Acid Sludge. This sludge is a waste product of the oil refining industry and the particular sludge used contained about 35% sulphuric acid together with oil tar derivatives.

(3) Cr. app. - Crown application. One or two holes (depending on the size of the bush) were made in the soil at the base of the plant, by means of a sharp pointed stick, in such a position that natural drainage would carry the chemical across the root system of the plants.

(4) Soil application. The chemical was squirted around the base of the plant, or if a solid was being used it was piled on top of the soil and a little dirt sprinkled over the substance used, in order to keep cattle away.

Cost Analysis of Chemical Eradication.

This section of the report presents a cost analysis of experimental chemical eradication in the West, for the field season of 1925, as conducted during the period June 1st to September 22. In Table II one concentration of each chemical used as a spray was arbitrarily selected, and costs figured for that chemical, and application of that chemical over an acre of Ribes of concentration as shown in column 9. Early in the field season experiment showed that over average conditions of topography and brush one man could spray three gallons of chemical per hour. One man spraying hour then, is represented by every three gallons of solution. The cost of this man spraying hour was obtained by taking the entire field costs of the project between the above two dates, less the actual cost of chemical, and dividing this total amount by the total hours of field work, Sundays and holidays excluded. This figure can of course be considerably lowered with improved methods of application and crew work. The actual cost of the chemical is obtained from the figure shown in the table; it must be remembered that chemicals were purchased in relatively small quantities, and for this reason it was necessary to use a quality much more refined than would be necessary for application on a larger scale. The cost of the chemical is therefore probably much higher than if the work was being done on a large scale.

Figures are presented on an acreage basis and are given as an indicator of the present general cost level of chemical eradication and as a means of comparing the various chemicals used during the past summer.

Table I

Total Cost of Chemical Eradication Field Project.

Payroll	$1322.84
Subsistence	715.90
Chemicals	250.33
Transportation of men	115.72
Equipment	70.24
Transp. of Equipment	6.00
" of Chemicals	3.50
	79.74
Total	$2484.53
Less total cost of chemicals	$2234.20
Actual time spent on project - 381 man days = 3048 man hours.	
Cost per man hour	$.733

Table II

Chemical	Concentration	Amt. Used	Cost per Pound or Gallon	Cost of Chemical per Acre	Time of Spraying Per Acre	Cost of Labor Per Acre	Total Cost Per Acre	No. of Ribes per Acre	Cost per Bush Sprayed
1. NaF +) NaOH)	4% 2	171.6 gals	$ .17 .12	$ 13.55	57.2 Hrs.	$41.90	$ 55.45	4026	$0.014
2. NaOH	4	158.4	.12	6.34	52.8	38.67	45.01	4316	.010
3. NaF	4	211.2	.17	11.97	70.4	51.65	63.62	2376	.027
4. $Na_2B_4O_7$	8	198.0	.10	13.20	65.9	48.40	61.60	2983	.021
5. A.W.P.	50	168.3	1.60Gal	134.80	56.1	41.18	175.98	3960	.045
6. $CaCl_2$	12	74.3	.20	14.85	24.7	18.12	32.97	637	.051
7. NaBr	8	165.1	.65	71.50	55	40.40	111.90	2402	.049
8. NaCl	20	118.8	.013/5	3.16	39.6	29.00	32.16	1228	.026
9. NH_4Cl	10	264.0	.15	33.00	87.8	64.50	97.50	2429	.040
10. NH_4Br	8	59.4	.93	36.90	19.9	14.51	51.41	468	.112
11. NH_4F	4	118.8	.75	29.64	39.6	29.02	58.66	647	.091
12. KF	4	118.8	1.00	39.60	39.6	29.02	68.62	1201	.057
13. NH_4NO_3	10	79.2	.18	10.70	26.3	19.35	30.05	594	.051
14. Kerosene	100	26.4	.25	6.60	8.8	6.46	13.06	647	.020
15. $BaCl_2$	20	36.0	.31	18.60	12.1	8.80	27.40	342	.042

Summary of Results

1. During the season 1925, 18 chemicals have been applied to wild Ribes in the field. They were as follows: Atlas N. P. Weed Killer, NaCl, NaBr, NaF, $Na_2B_4O_7$, NH_4Cl, NH_4Br, $(NH_4)_2Cr_2O_7$, NH_4F, NH_4NO_3, KF, $CaCl_2$, CaCl(OCl), $HgCl_2$, $BaCl_2$, NaOH, Kerosene, acid sludge. A short summary of results obtained from use of thesechemicals is given below.

Atlas N. P. Weed Killer - applied as spray to 954 R. lacustre, 1162 G. inermis, 106 R. petiolare in concentrations 10% - 100%. Best results obtained between concentrations 50% - 100%, and was particularly effective on R. petiolare at Wallace, Idaho, about 90% of live stem being killed. Defoliation complete. R. lacustre and G. inermis more resistant. Applied as crown application to 120 G. inermis in concentrations 20% - 100%. Concentrations of 100% gave best results. Some smaller bushes killed. 50% dead stem on larger bushes, defoliation complete.

NaCl (sodium chloride) - applied as spray to 185 G. inermis, 5 R. lacustre in concentrations 10% -20%. Only a slight burning effect on leaves. Applied as a crown application to 81 G. inermis and 5 R. lacustre (in solid form) about 2 lbs. - 5 lbs. per plant. Defoliation 90%. Several bushes dead. Applied also in liquid form in concentrations 10% and 20%. No appreciable defoliation, no dead stem. Action was more rapid on G. inermis than on R. lacustre.

NaBr (sodium bromide) - applied as spray to 17 R. petiolare, 161 G. inermis, 29 R. lacustre in concentration 8% and 10%. Defoliation 25%; no other effect. R. lacustre, R. petiolare, G. inermis equally resistant.

NaF (sodium fluoride) - applied as a spray to 7 R. petiolare, 129 R. lacustre, 96 G. inermis in concentrations 4% to 5%. Slight defoliation only, R. lacustre more resistant than G. inermis. Applied as crown application to 66 G. inermis in concentration of 4%. Several small bushes killed. Defoliation 50% over remaining bushes.

$Na_2B_4O_7$ (sodium tetraborate) applied as a spray to 2 R. petiolare clumps (40' x 20') and (50' x 35'), 83 R. lacustre, 183 G. inermis, in concentration of 10%. Non effective, R. petiolare, R. lacustre, G. inermis all equally resistant. Applied as a solid, crown application to 2 R. lacustre, 61 G. inermis. No effect.

NaOH (sodium hydroxide)	-	applied as a spray to 311 R. lacustre, 629 G. inermis in concentrations of 2% and 4%. Both concentrations are good defoliators, defoliation being complete. Amount of releaf is less with 4% solution than with 2%. Applied as a spray and soil application to 7 R. lacustre, 99 G. inermis. Defoliation complete and rapid. Extensive releaf. No stem killed. Applied as crown application to 30 G. inermis in concentration of 5%. No apparent effect on bushes. Resistance to chemical as follows. R. lacustre greater than R. petiolare greater than G. inermis.
$HgCl_2$ (mercuric chloride)	-	applied as a spray to 7 clumps R. petiolare (33 x 15) and 80' x 10' in concentrations 10% and 1%. In concentration of 10% rapid defoliation took place and complete releaf occurred in 10 days. No observed lowering of the plants vitality.
NH_4Cl (ammonium chloride)	-	applied as a spray to 799 G. inermis, 14 R. lacustre in concentrations 1% 12½%. Concentrations of 12½% resulted in complete defoliation, death of 1925 stem growth and 10% of older wood. No releaf. Applied as a crown application to 11 G. inermis in 24% solution plus crystal of solid, resulted in complete kill of all bushes treated. In another case a crown application of 20% solution on 96 G. inermis caused only 25% defoliation. G. inermis seems to be less resistant than R. lacustre.
NH_4Br (ammonium bromide)	-	applied as a spray to 5 R. lacustre, 264 G. inermis in concentrations 2½%-8%. A concentration of 8% resulted in defoliation of 40%. No releaf. No dead stem. Applied as a crown application to 36 G. inermis in concentrations of 4% and 8%. Both concentrations gave just slight defoliation and no other effec R. lacustre and G. inermis equally resistant to chemical.

NH_4F (ammonium fluoride)	- applied as a spray to 86 _G. inermis_ in concentration of 4% resulted in complete defoliation. 1925 stem killed. No releaf. Applied as a crown application to 35 _G. inermis_ in concentration of 4%. Resulted in 25% defoliation of large bushes, death of few small plants. No releaf.
$(NH_4)_2Cr_2O_7$ (ammonium bichromate)	- applied as a spray to 10 _G. inermis_ in concentration of 4%. Resulted in complete defoliation, no releaf and no stem killed. Applied as a crown application to 31 _G. inermis_ in 2% concentration resulted in 20% defoliation on large bushes. No releaf. 10% dead stem on small bushes, defoliation complete.
KF (potassium fluoride)	- applied as a spray to 91 _G. inermis_ in conentration of 4%. Resulted in complete defoliation. No releaf. 20% of 1925 stem growth killed. Applied as crown application to 22 _G. inermis_ in concentration of 4% resulted in complete defoliation. No releaf. Some small bushes killed.
$CaCl_2$ (calcium chloride)	- applied as a spray to 333 _G. inermis_ and 4 _R. lacustre_ in concentrations 10% and 12%. Leaves burned slightly. No other effect. Applied as crown application to 95 _G. inermis_ and 1 _R. lacustre_ in concentrations of 10%. No apparent effect on bushes.
CaCl(OCl) (bleaching powder)	- applied in solid form as a crown application to 18 _G. inermis_ - 1lb- 2lbs per bush. No effect.

NH_4NO_3 (ammonium nitrate) - applied as a spray to 192 G. inermis in concentrations of 5% and 10%. A concentration of 10% resulted in 40% defoliation. No releaf. No dead stem. Applied as a crown application to 47 G. inermis in concentrations of 10% and 20%. A concentration of 20% resulted in death of 1925 stem growth on smaller bushes. Defoliation 25%.

$BaCl_2$ (borium chloride) - applied as a spray to 89 G. inermis in concentrations of 8% and 20%. A concentration of 20% resulted in complete defoliation and death of several small bushes. Applied as a crown application to 36 G. inermis in 10% concentration gave no apparent deleterious results.

Kerosene - applied as a spray to 3 R. lacustre, 46 G. inermis (100%). Showed only a slight burning effect on the leaves. Applied as a crown application to 12 G. inermis, one pint of oil per bush. No apparent effect.

Acid Sludge - applied as a crown application to 10 G. inermis (100%), resulted in the death of all small plants so treated. Applied as a crown application to 7 G. inermis (diluted with equal volumes of water) resulted in complete defoliation with 5% dead stem.

2. Of the above compounds preliminary observations indicate the following:

a. Compounds containing the ammonium radical, with the exception of NH_4NO_3, in the case of spraying seem to be absorbed to some extent by the plant and cause defoliation and death of 1925 stem growth. NH_4Cl looked particularly favorable as a spray, while all the ammonium compounds were equally effective when used as crown applications.

b. Sodium compounds, such as NaCl, NaBr, NaF, do not seem to have the same toxic effect. Whether it is the effect of the anion or cation, or combination of both, it is hard to say at the present time. Some valuable research could be done on that phase of the problem.

c. Potassium salts, particularly KF, cause defoliation and considerable lowering of plant's vitality after a period of from three to seven days. The KF used above was in 4% solutions and it is thought that a 10% solution or even a little stronger should be a very effective spray.

d. No anion used was found to give constant results when applied in combinations with the several cations.

e. In general crown applications were the most effective and spray applications the least so, from the standpoint of rapid effect on the bushes. However, the method of spraying is decidedly superior to that of soil application from the standpoint of labor involved. In many cases, as for example _R. petiolare_ growing in marshy stream banks, it is hard to conceive of any method other than spraying.

f. From observations made a tentative gradation of susceptibility of Ribes to chemicals might be given as follows: _R. petiolare_, greater than _G. inermis_ greater than _R. lacustre_.

g. General results indicate that it is better to spray during warm dry weather than during cool damp weather.

3. The results of field work for the season 1924-1925 are sufficiently encouraging to justify further intensive experimentation both in the laboratory and the field.

Recommendations for Future Work.

The results given in the above report justify and indicate the necessity for further work of two distinct types. It must be remembered, however, that these recommendations and results have been drawn from observations on the plants made this fall. While the results are only tentative in view of the comparatively short time during which the experiment has been in progress, it is felt that the success obtained with some of the chemicals is sufficiently encouraging to warrant the performance of this outlined work.

1. <u>Field work</u>: the summer of 1926 should be devoted to field work which should constitute a direct development from the work of the 1925 season. This should consist of:

A. Careful checking of all plots on which chemicals were applied in 1925. After the start of the 1926 growing season, it will be possible to finally determine if the plants on any of the plots were killed by the chemicals applied.

B. Re-testing of the chemicals which appear to be most effective from the work of the 1925 season. In such re-testing work, particular attention should be paid to the most efficient percentage of the chemical in solution, the minimum dosage required to kill, and the most efficient and least expensive methods of application. This work to be done on an area adjacent and similar to one worked by hand eradication, so that costs and results can be compared.

C. Testing of new chemicals, on a less extensive scale than that of the re-testing work.

2. <u>Laboratory work</u>: one of the principal values of the field work thus far done is that it has definitely shown the need for certain intensive laboratory work to solve some of the basic questions arising in this entire problem. Such laboratory work may be briefly outlined as follows:

A. Absorption of chemicals thru the leaf tissue of plants

1. Review of literature.
2. Laboratory work.
    a. Absorption in general.
    b. Absorption of certain ions which might be combined with other ions, toxic in nature, toxic action thus being secured from absorption of the compound. From the results of the 1925 field season, particular attention to be paid to the K ion and NH_4 radical.

B. Toxic properties of inorganic ions.

1. Review of literature.
2. Laboratory work.
   a. Toxicity of inorganic cations. Test the toxicity of all soluble inorganic cations in combination with the one anion, by application, to Ribes plants.
   b. Toxicity of inorganic anions. Repeat the above expriment, using an inorganic cation the salts of which are soluble, and test the anions on Ribes.
   c. Combination of most promising inorganic cations and anions. Combine the cations and anions showing the greatest toxic effect, and test the compounds on Ribes.

C. Toxic property of organic groups. Insofar as possible, organize similar experiments with organic compounds.

D. Investigation of toxic properties of oils emulsified with solution of toxic compounds.

E. Morphological study of some 400 specimens of Ribes stem gathered from plots treated in 1925, representing all chemicals used, to determine effect of these chemicals.

F. Investigation of value and use of spreaders and stickers in sprays applied for the purpose of killing Ribes.

G. Investigation of promoters or activators of physiological action of toxic chemicals used.

H. Investigation of mechanical equipment for use in applying chemicals to Ribes.

BLISTER RUST CONTROL WORK IN WASHINGTON, 1925

Blister rust control work in Washington during 1925 consisted of cultivated black currant eradication and scouting for the disease in the eastern and western portions of the state. Since the western branch office is located in Washington, no state leader has been assigned to that state, the work being directed from the Spokane office.

Cultivated Black Currant Eradication, Washington, 1925

Cultivated black currant eradication was carried on in central Washington, from approximately June 15 to September 15, 1925. The field force engaged upon this work consisted of 4 Field Assistants, with 2 autos, and a Field Supervisor with an auto, thus making a total force of 5 men with three autos.

Since no state legislation is in effect in Washington requiring the destruction of cultivated black currants, eradication of the located bushes was secured by the voluntary consent and cooperation of the owners. Before the bushes were eradicated, the signature of the owner was secured to a voluntary release statement. Following the eradication, a copy of Farmers' Bulletin No. 1398, and the following letter was sent to each owner:

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

BLISTER-RUST CONTROL

618 Realty Bldg.,
Spokane Wash.
Sept.8,1925.

Dear Sir:

Your name is on our list as one who cooperated with the state and the nation in the fight to control the White Pine Blister Rust. From this fact we feel that you will be interested in the enclosed Farmers' Bulletin #1398, recently published by the U. S. Department of Agriculture.

Beginning on page 18 of this bulletin you will find a discussion of Blister Rust. On the inside of the cover and on pages 20, 21, 22, 23, you will find special references to cultivated black currants. On page 36 you will find a statement of Washington's Black Currant Law. And on pages 36, 37, 38 is given a digest of the quarantine regulations affecting the sale and distribution of currants, gooseberries and white pines.

If you are interested in raising currants or gooseberries you will be interested in the entire bulletin.

After reading this bulletin you may have questions arise in your mind about the Blister Rust situation in Washington or about black currant eradication. If you will write to the Blister Rust Office, 618 Realty Bldg., Spokane, Washington, we will try to answer your questions. If you have currants, gooseberries or white pines you fear are infected by this disease send in specimens and we will determine them for you.

The U. S. Department of Agriculture and the Washington State Department of Agriculture appreciates your past cooperation in this disease control work and hopes that you will continue your cooperation by doing anything you can to make for success in the work.

Yours very truly,

C. R. Stillinger,

C. R. Stillinger,
Associate Pathologist.

crs/k
Encl.

The results of this work are given in the following tabulation:

Table No. I.
Cultivated Black Currant Eradication
Washington, 1925

County	Plantings Eradicated	Plants Eradicated
Whitman	16	43
Douglas	4	18
Adams	0	0
Okanogan	115	854
Franklin	1	3
Grant	4	24
Lincoln	15	71
Total	155	1013

Scouting for the Disease, Eastern Washington

During September two men with an auto scouted for the disease in Spokane, Pend Oreille, Stevens and Ferry counties of eastern Washington. The memorandum of instructions given to these men is as follows:

618 Realty Bldg.,
Spokane, Wash.,
Sept. 10, 1925

Instructions to
Sprague and Spiegelberg, for Scouting in Eastern
Washington, September 1925.
* * *

Gentlemen:

Your itenerary is for scouting will be as follows: Spokane to Newport to Metaline Falls and north to Boundary line: from Metaline Falls south to Tiger. Tiger to Colville to Echo to Marble to Northport to Boundary and Velvet. Northport to Bossburg to Evans to Marcus. Marcus to Boyd to Orient to Laurier. Laurier to Danville to Republic. Republic to Bridge to Gifford to Addy to Loon Lake, to Spokane.

You will be expected, in so far as possible, to make inspections of wild or cultivated Ribes at points 5 miles apart along your route. At each point inspect a considerable number of bushes. Make your inspections at a given point over as large an area as possible. By this I mean do not inspect a large number of bushes within a 100 yard circle, but scatter your inspection over a half mile or so if bushes can be found.

To the best of our knowledge the order of importance of the various species is as follows: Ribes nigrum, R. petiolare, R. aureum, G. inermis, G. cognata, R. viscosissimum, R. lacustre, R. vulgare. Do not fail to inspect the bushes of lesser importance if those at the top of the list are not available; but inspect the more susceptible ones if they can be found. You will, of course, make every possible effort to secure the eradication of any bushes of Ribes nigrum that you may find in the course of your work.

Will you please keep a complete set of notes in the field note books supplied to you. You should put notes for each inspection p point on a separate page of the note book. These notes should include the following points:

1 - Locality
2 - Date
3 - Distance from last inspection point.
4 - Number of bushes of Ribes inspected.
5 - Site condition of Ribes, that is, sun or shade, moist or dry.
6 - Name of the man making the notes.
You may add any other notes which you think may be of value or interest.

Should you find infection at any point it will be necessary to take more complete notes. These should include:

1 - Number of Ribes inspected.
2 - Number of Ribes bushes infected.
3 - Percent of leaves infected on each infected bush.

You should also make a thorough examination of any white pine which are to be found in the vicinity and also scout over a considerable region to find other infected Ribes. Will you please wire me at once should you find infected bushes, and immediately send ample specimens of the infected leaves to this Office, taking care to see that they arrive here in good condition.

There has been sufficient rain during the last two weeks to bring out any incipient infection of blister rust which may have occurred on Ribes in this region. I am particularly anxious to have a very thorough job of scouting done. You are expected to spend the balance of the month of September in scouting the region assigned to you. Should a longer time be necessary do not hesitate to extend this period. I want you to stay in this region until you have made every possible effort to find blister rust if it is there.

Stephen N. Wyckoff,
Pathologist.

snw/k

The following tabulation gives the result of this work, during the course of which no infection was found.

Table No. II.
Summary of Results
Scouting for the Disease, Eastern Washington
September, 1925

County	Number of Inspection Points	Av. Dist Between Inspection Points (miles)	Ribes Inspected								
			Native Species					Cultivated Species			
			R. lacustre	R. viscosiss.	R. petiolare	R. cereum	G. inermis	R. nigrum	R. vulgare	G. reclinata	Total
Spokane	7	5.29			50		81				131
Pend Oreille	34	4.18	2677	736	375		263	5	6	5	4067
Stevens	66	5.10	3482	218	2145	49	2274	2	1	25	8196
Ferry	34	4.32	1067	351	3764	204	5624	18	30		11058
	141	4.62	7226	1305	6334	253	8242	25	37	30	23452

An account of scouting in Western Washington will be found in Mr. Goodding's report for Oregon. The Oregon scouts extended their operations northward into Western Washington, this being the least costly way to have the work done.

BLISTER RUST CONTROL WORK IN OREGON, 1925.

Blister rust control work in Oregon during 1925 was organized under the terms of the cooperative agreement, given below. Mr. L. N. Goodding, Assistant Pathologist, has directed the work as State Leader, and is headquartered at Corvallis, Oregon, office space for the several projects being provided by the Oregon Agricultural College.

MEMORANDUM OF UNDERSTANDING BETWEEN THE OREGON STATE BOARD OF HORTICULTURE, THE OREGON STATE BOARD OF FORESTRY, THE OREGON AGRICULTURAL COLLEGE AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN OREGON.

EFFECTIVE JULY 1, 1925 to JUNE 30, 1926.

The object of this memorandum of understanding shall be to facilitate the prompt location and eradication or effective control of white pine blister rust in Oregon in view of the threatened destruction of private, state, and nationally owned timber throughout the West as a result of the presence of this disease in British Columbia and Washington, and the danger of its further spread by natural dissemination or quarantine violations.

It is agreed that the Oregon State Board of Horticulture, the Oregon State Board of Forestry, the Oregon Agricultural College and the Bureau of Plant Industry shall cooperate to the above ends in accordance with the following plan:

1. The Bureau of Plant Industry shall pay the salaries and expenses of one or more men who shall perform necessary scouting for the disease in Oregon. The Oregon State Board of Horticulture shall deputize these scouts to enable them to enter and inspect any property. The Bureau of Plant Industry shall further pay the salary and expenses of a requisite number of men who shall conduct local control experiments in southern Oregon, to determine the most feasible methods of protecting western white and sugar pine timber and reproduction from white pine blister rust.

2. In view of the fact that the Oregon State Board of Horticulture has no special appropriation for blister rust control, the Bureau of Plant Industry shall pay the salaries and expenses (in accordance with the fiscal regulations of the United States Department of Agriculture) of one or more men who shall be deputized by and work under the authority and direction of the Oregon State Board of Horticulture to locate and secure the general destruction of cultivated black currant plants in Oregon. These men shall also destroy host plants

1925.

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MEMORANDUM OF UNDERSTANDING BETWEEN THE OREGON STATE BOARD OF HO[illegible]
[illegible]
AGRICULTURE RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF [illegible]
BLISTER RUST IN OREGON.

EFFECTIVE JULY 1, 1925 to JUNE 30, 1926.

The object of this memorandum of understanding shall be to facilitate the prompt location and eradication or effective control of white pine blister rust in Oregon in view of the threatened destruction of private, state, and nationally owned timber throughout the West as a result of the presence of this disease in British Columbia and Washington, and the danger of its further spread by natural dissemination or quarantine violations.

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2. In view of the fact that the Oregon State Board of Horticulture has no special appropriation for blister rust control, the Bureau of Plant Industry shall pay the salaries and expenses (in accordance with the fiscal regulations of the United States Department of Agriculture) of one or more men who shall be deputized by and work under the authority and direction of the Oregon State Board of Horticulture to locate and secure the general destruction of cultivated black currant plants in Oregon. These men shall also destroy host plants

diseased with or exposed to infection from white pine blister rust, as directed by the Oregon State Board of Horticulture.

3. The Oregon State Board of Horticulture and the Bureau of Plant Industry shall cooperate with the Federal Horticultural Board in inspection for the purpose of aiding in the enforcement of State and Federal blister rust quarantines now in effect or which may be promulgated. The Bureau of Plant Industry shall pay the salaries and expenses and direct the work of one or more men who shall during the proper season inspect for violations of the Federal blister rust quarantine in the State of Oregon. These men shall also cooperate with the Oregon State Board of Horticulture in enforcing State quarantines. For this purpose they shall receive instructions in writing in methods of procedure from the Oregon State Board of Horticulture and shall be deputized to destroy plants shipped in violation of State quarantines.

4. The Oregon State Board of Horticulture and its cooperators shall use their regular employees, so far as their other duties permit, in systematically locating and destroying cultivated black currants and infected or potentially infected blister rust host plants; in scouting for the blister rust; in inspecting nurseries for this disease and in enforcing State and Federal blister rust quarantines. Such work will represent an expenditure by the Oregon State Board of Horticulture and its cooperators of approximately $13000.00. The expenditures of the Bureau of Plant Industry indicated in previous paragraphs will aggregate approximately $11000.00 but none of the Federal funds shall be spent in compensation for plants destroyed in control work.

5. The Oregon State Board of Forestry shall use its regular employees, so far as their other duties permit, in systematically locating cultivated black currants, in scouting for the blister rust on its wild and cultivated host plants and in assisting those employed by the Blis-Rust Office in reaching isolated areas where inspection, eradication or other operations are deemed necessary and will conduct local control operations in valuable pine areas so far as funds permit. Such work will aggregate a total expenditure by The Oregon State Board of Forestry of approximately $7000.00 for the control of this disease during the period covered by this agreement.

6. The Oregon Agricultural College agrees to examine all specimens suspected of being infected with white pine blister rust when sent in by the field scouts and others, and to keep the necessary records of such collections. It is also agreed that all specimens which are suspected of being infected with the blister rust shall be submitted to the Bureau of Plant Industry for final determination. It is agreed that the County Agents and others of the Extension Service of the Oregon Agricultural College shall assist in the general publicity work by cooperation with the black currant eradication men in conducting the eradication compaigns in their respective territories. It is further agreed that the Oregon Agricultural College shall furnish Mr. L. N. Goodding, the

diseased with or suspected to infection from white pine blister rust, as directed by the Oregon State Board of Horticulture.

3. The Oregon State Board of Horticulture and the Bureau of Plant Industry, shall cooperate with the Federal Horticultural Board in inspection for the purpose of aiding in the enforcement of State and Federal blister rust quarantines now in effect or which may be promulgated. The Bureau of Plant Industry shall pay the salaries and expenses and direct the work of one or more men who shall during the project season inspect for violations of the Federal blister rust quarantine in the State of Oregon. These men shall also cooperate with the Oregon State Board of Horticulture in enforcing State quarantines. For this purpose they shall receive instructions in writing in methods of procedure from the Oregon State Board of Horticulture and shall be deputized to destroy plants shipped in violation of State quarantines.

4. The Oregon State Board of Horticulture and its cooperators shall use their regular employees, so far as their other duties permit, in systematically locating and destroying cultivated black currants and infected or potentially infected blister rust host plants; in scouting for the blister rust; in inspecting nurseries for this disease and in enforcing State and Federal blister rust quarantines. Such work will represent an expenditure by the Oregon State Board of Horticulture and its cooperators of approximately $15000.00. The expenditures of the Bureau of Plant Industry indicated in previous paragraphs will aggregate approximately $11000.00 but none of the Federal funds shall be spent in compensation for plants destroyed in control work.

5. The Oregon State Board of Forestry shall use its regular employees, so far as their other duties permit, in systematically locating cultivated black currants, in scouting for the blister rust on its wild and cultivated host plants and in assisting those employed by the Blister Rust Office in reaching isolated areas where inspection, eradication or other operations are deemed necessary and will conduct local control operations in valuable pine areas so far as funds permit. Such work will aggregate a total expenditure by The Oregon State Board of Forestry of approximately $7000.00 for the control of this disease during the [illegible]

6. The Oregon Agricultural College agrees to examine all [illegible] specimens suspected of being infected with white pine blister rust [illegible] in by the field scouts and others, and to keep the necessary records of such collections. It is also agreed that all specimens which are suspected of being infected with the blister rust shall be submitted to the Bureau of Plant Industry for final determination. It is agreed that the County Agents and others of the Extension Service of the Oregon Agricultural College shall assist in the general publicity work by cooperation with [illegible] campaigns in their respective territories. It is further agreed that the Oregon Agricultural College shall furnish Mr. L. N. Goodding, [illegible]

representative of the Bureau of Plant Industry engaged in blister rust control work in Oregon, such office space as is necessary for properly conducting his work. Such work will aggregate an expenditure on the part of the Oregon Agricultural College of approximately $1500.00 for the control of this disease, during the period covered by this agreement.

7. All official records showing work performed under this agreement shall be open to inspection of the Oregon State Board of Horticulture, the Oregon State Board of Forestry, the Oregon Agricultural College or the Bureau of Plant Industry on request. All findings of the blister rust made by either the Oregon State Board of Horticulture, the Oregon State Board of Forestry, the Oregon Agricultural College or the Bureau of Plant Industry shall be promptly reported to the other parties. All specimens collected or received by the Oregon State Board of Horticulture, the Oregon State Board of Forestry and their cooperators which are suspected to be infected with blister rust shall be submitted to the Oregon Agricultural College for critical determination. The Bureau of Plant Industry shall give such technical information to the employees of the Oregon State Board of Horticulture or the Oregon State Board of Forestry and their cooperators as will enable them to recognize the several stages of the disease.

8. It is understood that the Bureau of Plant Industry shall be primarily responsible for scouting and location of the blister rust in Oregon and for technical information on its control, but that the Federal Government has no authority to destroy private or state property and therefore the Oregon State Board of Horticulture shall be wholly responsible for the destruction of such pine, currant and gooseberry plants as may be found necessary in order to control the spread of this desease in Oregon, including plants shipped in violation of the State and Federal blister rust quarantine regulations.

9. This memorandum of understanding shall take effect July 1, 1925 and continue in force until June 30, 1926, or until previously terminated by mutual consent of the parties concerned.

Date	Signature
June 5, 1925	(s)Chas. A. Park as President Oregon State Board of Horticulture
June 5, 1925	(s) C. A. Elliot State Forester Oregon State Board of Forestry
June 3, 1925	(s) H. P. Barss Plant Pathologist, O. A. C. Oregon Agricultural College
June 3, 1925	(s) Paul V. Maris, Direction of Ext. Service Oregon Agricultural College
July 8, 1925	(s) W. A. Taylor, Chief Bureau of Plant Industry, U.S.Department of Agriculture

Blister Rust Activities for the State of Oregon for the year ending December 31, 1925

L. N. Goodding, Assistant Pathologist.

The Oregon work during the past year covered a much wider field than in previous years. Two distinctly new projects were started, namely: The experimental Ribes Eradication on National Forests with the attending Reconnaissance, and The Reconnaissance on privately owned land in western Oregon. Two projects extended into adjacent Washington and are discussed in this report. The work is considered under the following heads:

I. A preliminary survey of conditions in eastern Oregon to determine the advisability of black currant eradication.

II. State cooperation.

III. Quarantine inspection.

IV. Experimental Ribes eradication in Oregon National Forests, by P. E. Melis.

V. Reconnaissance of Federal lands, Southwestern Oregon, by P. E. Melis and Paul S. Pieper.

VI. Black currant eradication, by T. D. Mallery.

VII. Reconnaissance on privately owned land in Northwestern Oregon, by A. Grasvosky.

VIII. Educational work.

a. Panel Exhibits.
b. Blister Rust Film.
c. Fair Exhibits.
d. Posters and Bulletins
e. Newspapers.
f. Talks.
g. Form letters.

IX. Inspection for Blister Rust.

X. Nursery inspection.

XI. Wind River Nursery.

XII. Recommendations.

I. <u>Preliminary survey of conditions in Eastern Oregon to determine the advisability of black currant eradication</u>: A trip was made into eastern Oregon in January, the purpose of which was primarily to ascertain conditions favoring Ribes cultivation and consequent need for black currant eradication. The secondary purpose was to visit High School principals, superintendents and science teachers to get their opinions regarding the advisability of putting something permanent into the schools on Blister Rust. Forest Service offices and herbaria were also visited and data obtained on pines and Ribes.

The principal towns in northeastern Oregon were visited. While very few black currant locations were made, interviews with county agents and county fruit inspectors and a study of general conditions of the region led to the conclusion that black currant eradication should be undertaken. Umatilla, Wallowa, Union and Baker Counties were found to have extensive fruit growing and irrigated sections and Mr. Weatherspoon, the Horticultural Commissioner for that district, strongly advised systematic eradication.

The science and agricultural teachers as well as superintendents and principals of High Schools were favorable to making Blister Rust a subject to be treated in connection with agriculture and science courses but did not favor circularizing all the teachers in the state. They thought it inadvisable to have anything done outside of the science courses.

Forest Service offices in the region were visited and Ribes and White pine locations were obtained. According to these records the only White pines in the extreme northeastern part are about 15 miles due north of Elgin and a few more east of Bear Creek Ranger Station in the same general region.

The Ribes found in collections were only those to be expected. One new grossularia was reported for the state, namely: <u>G. Watsoniana</u>. It was found in Henderson's collections at the Hood Riber High School and was recorded from but one locality - on the north slope of Mount Hood.

<u>NOTE</u>: In connection with Black currant eradication at a later date it was learned that <u>Pinus abicaulis</u> is widely distributed on the high points. It is particularly aboundant in the Wallowa Mountains.

I. Preliminary survey of conditions in Eastern Oregon to determine [illegible]

[illegible] eastern Oregon in January, the purpose of which was primarily to ascertain conditions favoring Ribes cultivation and consequent need for black currant eradication. The secondary purpose was to visit [illegible] their opinions regarding the advisability of putting something permanent into the schools on Blister Rust. Forest Service offices and herbaria were also visited and data obtained on pines and Ribes.

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The Ribes found in collections were only those to be expected. One new grossularia was reported for the state, namely: G. [illegible] [illegible] and was recorded from but one locality - on the north slope of Mount Hood.

NOTE: In connection with Black current eradication at a later date it was learned that Pinus albicaulis is widely distributed on the high points. It is [illegible]

II. <u>State cooperation:</u> A new cooperative agreement was drawn up with the state. Parties to the agreement were the State Board of Horticulture, The State Board of Forestry, the Oregon Agricultural College and the Bureau of Plant Industry. By the agreement the amount to be expended by the state was increased $6225. Five hundred dollars of this was an entirely new item and consisted of an estimate by Paul V. Maris, director of the Extension Service of Oregon Agricultural College, of the probable amount of service which the county agents could render. No actual appropriation was made but different offices were instructed to render additional service.

The annual convention of the State Fire Wardens was held in Salem on May 4 and 5. Attendance at this meeting gave opportunity to enlist the active interest of fire wardens and others. A short talk was made on the subject of Blister Rust.

Prior to the time black currant eradicators took to the field the Extension Service notified the county agents of the approximate date workers would reach their counties and instructed them to render what assistance was possible in connection with their other duties. Mr. Mallery reported that this assistance was invaluable.

The fruit inspectors rendered valuable services. It is, however, difficult to get them to assume the burden of responsibility of getting black currants eradicated. They are willing to assist but not pursue the initiative.

The Oregon Agricultural College is furnishing office space to P. E. Melis in addition to the item mentioned in the cooperative agreement.

III. <u>Quarantine inspection:</u> Mention should be made of the work done in quarantine inspection on the interstate bridge at Vancouver and at the ferries at points below Portland last spring. As a result of observations made by Mr. Simcoe on the Vancouver bridge it was learned that sight-seers and joy-riders from Portland particularly were going into Washington and bringing back quantities of red flowering currants both as bouquets and as bushes for planting. Investigation also showed that quantities of these bouquets brought from Washington were being sold in the Yamhill Market in Portland.

After some difficulties the State posted signs on the interstate bridge, the ferries and approaches. The posters could be read by motorists at considerable distance. They called attention to a possible penalty for bringing currants and gooseberries, including the red flowering currant, into Oregon. Observations made

before and after posting the roads, bridges, and ferries indicated that the signs were invaluable. Very few violations were intercepted after they were put up.

This investigation called attention to the fact that no systematic work of inspection is undertaken on the bridges or the ferries by either the state or the government. In another place it has been suggested that the shipping of quantities of nursery stock in trucks from nurseries in Washington to those in Oregon is more than likely. If adequate quarantines are to be maintained this loophole must be closed.

IV.
Experimental Ribes Eradication - Oregon

by

Percy E. Melis - Junior Forester.

In accordance with the provisions of the ten-year program, this past field season marks the initial step in local control work in Oregon. The selection of an area for this experiment was taken up early in 1925. From a comparison of the cruises on different National Forests in District 6 the Crater was selected as having the best stands of sugar pine.

The detailed type maps and cruises of the Crater National Forest were then consulted and four tentative locations chosen. These locations were carefully inspected and compared. The choice was made in consideration of the good sugar pine stand and favorable reproduction conditions; the great amount of Ribes and large number of species; and the wide range of eradication conditions presented.

The area selected is in T 31 S, R 2 E, Willamette M. and is near Woodruff Meadows Ranger Station. It is in general on a southeast facing slope between the Rogue River and the Umpqua divide. Four small streams with smaller branches constitute the drainage system. The streams have cut deep canyons in the otherwise quite regular slope, so there are slopes of varying steepness facing every direction except northwest.

The average elevation is about 4000 feet but there are differences of more than 1000 feet between the highest and lowest points. The soil is of decomposed lava base and is well covered with humus and duff.

Timber species occur in the following order of numerical importance: Douglas fir, sugar pine, white fir (A. concolor), white pine (P. Monticola), yellow pine, incense cedar and hemlock.

The brush is mostly, though not entirely, confined to moist

parts of the area. The stream canyons and all springs and swamps have very dense brush. The principal genera of brush on these sites in the order of their handicap to eradication are: Acer, Salix, Cornus, Corylus, Alnus, and Amelanchier. The openings in the timber on the drier sites are grown up to dense Ceanothus which is also a serious impediment to eradication. The ground cover consisting of coniferous seedlings, brush and herbaceous vegetation varies from heavy to practically none, depending on the amount of light and moisture available. In general the area may be described as representing the best of the Sugar pine-fir type to be found in Oregon.

The purposes of the project were as follows:

1. To work out eradication methods best suited to the working conditions of the country.

2. To obtain accurate information as to the working conditions presented by this timber type.

3. To develop accurate statistics as to the cost of eradication on the different eradication types.

4. To develop a personnel in anticipation of a future need.

5. To afford actual protection to pine values on the area upon which the experiment was conducted.

An attitude of conscious scientific experimentation was maintained throughout the entire project. Much stress was placed on thoroughness, accuracy and efficiency of operation. Constant effort was made to avoid any slipshod work or unscientific conclusions. While the costs were kept as low as possible this was a purely secondary consideration in comparison with thoroughness.

Eradication work began on June 19 and continued without serious interription until September 12. The remarkable good weather and the accessibility of the country contributed to the above good fortune.

Division of Area into Types

The area upon which local control was performed was divided into seven distinct eradication or working types. Each of these eradication types represents a different set of working conditions.

The types are named and described as follows:

parts of the area. The stream canyons and all springs and swamps have very dense brush. The principal genera of brush on these sites in the order of their handicap to eradication are: Acer, Salix, Cornus, Corylus, Alnus, and Amelanchier. The openings in the timber on the ridge-sides are grown up to dense Ceanothus which is also a serious impediment to eradication. The ground cover consisting of coniferous seedlings, brush and herbaceous vegetation varies from heavy to practically none, depending on the amount of light and moisture available. In general the area may be described as representing the best of the Sugar pine-fir type to be found in Oregon.

The purposes of the project were as follows:

1. To work out eradication methods best suited to the general conditions of the country.

2. To obtain accurate information as to the working conditions presented by this timber type.

3. To develop accurate statistics as to the cost of application of the different eradication types.

4. To develop a personnel in anticipation of a future need.

5. To afford actual protection to pine values on the area upon which the experiment was conducted.

An attitude of conscious scientific experimentation was maintained throughout the entire project. Much stress was placed on thoroughness, accuracy and efficiency of operation. Every effort was made to avoid any slipshod work or unscientific conditions. While the costs were kept as low as possible this was a purely secondary consideration in comparison with thoroughness.

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The types are named and described as follows:

CREEK TYPE.

A strip of varying width along streams, averaging about three chains on each side, with dense brush and sufficient herbaceous vegetation to make complete ground cover. The brush consists mostly of Acer, Salix, Cornus, Corylus, and Alnus.

Principal species of Ribes are R. lacustre, R. sanguineum and G. klamathensis.

This type is worked by crew in close formation.

Average Ribes per acre -- 174. Acres worked -- 296.

BRUSHY BURN TYPE.

A burned over area, covered mostly with Ceanothus and Salix and with a considerable amount of coniferous reproduction.

Average density of brush ranges from "6" to "8" (on basis of "10").

Principal species of Ribes are R. sanguineum and G. lobbii.

This type is worked by crew in close formation.

Average Ribes per acre -- 34½ Acres worked -- 34

OPEN MATURE TIMBER TYPE.

Areas consisting mainly of the drier slopes and ridges. There is an over-story of mature sugar pine and Douglas fir with some yellow pine and incense cedar and a partial under-story of the same species. The ground cover consists of seedlings of the above species competing with various shrubs and herbaceous plants.

The country is quite open and has few Ribes, the principal species are R. sanguineum and G. cruenta.

This type is worked by scouts using a wide interval.

Average Ribes per acre -- 2¾ Acres worked -- 811

TRANSITIONAL TYPE.

This type usually occurs as a strip from 6 to 10 chains in width above and paralleling the creek type. Brush of creek type species is present but is less dense. Principal species of Ribes

are R. sanguineum and R. lacustre.

This type is worked by crew from 8 to 10 feet spacing.

Average Ribes per acre -- 42 Acres worked -- 286

BRUSHY MATURE TIMBER TYPE.

This type is comparable to the Open Mature Type but the increased amount of brush, reproduction and Ribes make it necessary to work it largely by crew.

The principal Ribes are R. sanguineum and G. lobbii.

Average Ribes per acre -- 15¼ Acres worked -- 93

REPRODUCTION AND BRUSH PATCHY TYPE.

An area upon which the mature timber has been greatly thinned by fire or insects and upon which the openings thus formed have grown up to reproduction and brush. The reproduction is principally Douglas fir and sugar pine and the brush, Ceanothus and Salix.

The principal species of Ribes is R. sanguineum.

The irregular nature of this type makes it expedient to use both open and close formation in working.

Average Ribes per acre -- 4 Acres worked -- 67

BOTTOM LAND MATURE TIMBER TYPE.

Comparatively flat areas of low land covered with a dense stand of mature timber. The timber is principally Douglas fir, white pine and white fir with reproduction of the same species. The brush is mainly Acer, Cornus, Salix and Corylus and there is herbaceous vegetation wherever there is sufficient light to support it.

The Ribes are comparatively few due to the dense shade. The principal species are R. sanguineum and R. lacustre.

Parts of this type required crew formation in working but most of it was eradicated by scouts.

Average Ribes per acre -- 6¾ Acres worked -- 287

Methods of Work

Methods of procedure developed in Idaho eradication during 1923 - 24 were used almost exclusively on this project. The personnel consisted of a Field Supervisor, two scouts, two crews and a utility man. Each crew was composed of five laborers and a crew foreman. The Field Supervisor was responsible to the Spokane Office for the administration and direction of the project. With the advice of the scouts and crew foremen he established the type divisions and boundaries, directed the progress of the work and kept official records. The scouts laid out the types into working units or blocks establishing boundaries by paper trails or blazes. They also eradicated extensive areas of the comparatively open country where the Ribes were few and widely scattered.

The crew foreman was responsible for the work of his crew; he acted as checker, time-keeper and boss. The crew would proceed, five men, approximately abreast, from some previously established starting place and work the block in successive parallel strips. The foreman kept behind his crew, assisting the men in keeping in proper formation, checking for missed Ribes and keeping tally of number and species of Ribes pulled. Each crew man was required to keep sufficiently close to his "guide" to enable him to readily distinguish any Ribes, however small, which might be between them. Early in the season a maximum distance of 8 feet between men was allowed, but as the men became accustomed to the work and more familiar with the Ribes, the density of the brush was permitted to regulate the spacing of the men. The outside man carried a supply of paper, cut into 4-inch squares, and distributed it as he proceeded. On the return trip he would follow his line of paper and someone else would lay the trail.

Eradication by scouts consisted principally of making sure that there were no Ribes present.

In an area where Ribes were found to be very scarce two or three men would work wide parallel strips looking for openings in the timber, water holes and other potential Ribes locations, rather than individual Ribes bushes. The distance between men would vary from forty to eighty feet depending on the topography and vegetation of the country. When Ribes were found they were eradicated and tallied as was done in the regular crew work. This method of procedure is recommended wherever the nature of the country permits.

Near the end of the season a deviation from the above practices was tried with very satisfactory results. In an area of excessively heavy Ribes growth three men were put to work pulling the conspicuous bushes. Since they spent no time looking for the small, hidden or otherwise inconspicuous Ribes they could work very rapidly. When the bushes of the first pulling had had time to dry out sufficiently to decidedly alter their appearance the crew covered the area in regular formation pulling those that had previously escaped notice. It

[illegible]

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is believed, though as yet not proved, that this method will both reduce the cost and increase the thoroughness of operation for areas having four hundred or more bushes per acre.

Results of Work

A total area of 1874 acres, averaging 37½ Ribes per acre, was eradicated. The salient features of the work by types, by areas and by species of Ribes are all shown in the following table:

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[illegible]

[illegible]

A total area of 1874 acres, averaging [illegible] Ribes per acre, was eradicated. The salient features of the work by types, by acres and by species of Ribes are all shown in the following table:

Table No. I.

Tabular Summary of Oregon Eradication - 1925

Type	Acres	Ribes per Acre	Total Ribes	RIBES R. lac.	R. sang.	R. visc.	R. cer	GROSSULARIA G. klam.	G. lobbii	G. binem	G. cruenta	Crew Days	Scout Days
Creek	296	174	51,553	21,757	17,251	94	1	10,219	865	865	481	74½	26
Brushy Burn	34	34½	1,173	76	965	10			121		1	3	4
Open Mature Timber	811	2¾	2,231	441	1,293	75			153	8	261	11	30
Transitional	286	42	12,015	1,572	9,494	62	3		171	5	708	29	8
Brushy Mature Timber	93	15¼	1,418	123	824	167			304			6½	4
Reproduction and brush-patchy	67	4	273	23	230	15			5			1½	6
Botton land Mature Timber	287	5¾	1,683	532	713	146			216	76		9	5
Total for all types	1,874	37½	70,346	24,524	30,770	569	4	10,219	1,855	954	1,451	134½	83

The knowledge and understanding of working conditions gained by this project may well be expressed by mentioning some of the difficulties encountered. *Ribes sanguineum* was found to be the principal and most troublesome species of the region. Its well developed tap-root made it particularly difficult to pull. It was not at all unusual for an entire crew to be held up for five minutes, and sometimes more by one large bush. Later in the season a small cutting and grubbing tool was carried by one member of each crew. This proved to be a decided help in handling the larger bushes.

Another troublesome feature of *Ribes sanguineum* was that its leaf coloring and formation blended so well with the other vegetation that it was unusually difficult to distinguish. This fact very materially retarded the progress of the crews. Attempts to speed up the eradication always resulted in a marked increase in the number of missed Ribes. Since a consistent thoroughness was necessary to the value of the project, the progress of the crews was consequently very slow. In a few blocks where other species of Ribes predominated, much better time was made.

The greatest difficulty encountered was not peculiar to this project but seems to be shared by all work of a like nature. It is the loss of time caused by a part of the crew being idle while waiting for the men on the other end of the line. To reduce this loss of time to a minimum is the most difficult task of the crew foreman. Several variations of spacing the men in the crew were tried. The foreman and nearer crew men would swing in and assist those men encountering especially difficult concentrations of Ribes, but only in very extreme cases should the entire crew line be broken up. When the formation is destroyed and the men are working in a group there is a joint responsibility for the Ribes and consequently more "misses". Every situation call for its own solution. Some lost time is unavoidable, but a great deal of the time usually lost can be saved by careful foremanship.

For best results this work requires men who are alert, active, interested and conscientious. Due to the above requirements and the seasonal nature of the work it has been found very satisfactory to employ young men from the colleges and universities. This work provides ideal summer employment for Forestry and Botany students and these students, almost without exception, have given excellent service. It is desirable to employ men early in their school work so that they will be available for several consecutive seasons. The crew-foreman and scout positions should be filled in the future from men who have had at least a season's experience in eradication work.

Cost of Work

The total cost of the work herein discussed was $4580.52. This may well be classified under the following general headings: labor, subsistence and overhead.

Labor - time actually spent on Ribes eradication

134½ crew days	@	$16.60	$2232.70	
83 scout days	@	3.30	273.90	$2506.60

Subsistence - Actual cost of meals, including cost of supplies, transportation of supplies and all cooking charges prorated to number of meals served in camp.

4106 meals	@ 33¢	$1354.98

Overhead - all other costs

Supervision	$378.35	
Camp detail (Building camp, striking camp)	184.60	
Equipment charge (1/3 of cost)	108.22	
Transportation (men & equipment)	47.77	718.94
Total		$4580.52

It is seen from the above figures that the following comparative percentages obtain for the entire project.

	Amount	Percentage of total
Labor	$2506.60	55
Subsistence	1354.98	29½
Overhead	718.94	15½
Total	4580.52	100

In order to make an equitable distributing of costs to the different eradication types the actual man days expended on each type were used as a basis for prorating the subsistence and overhead charges. The result is shown by the following tabular statement:

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Total	4580.52	100

In order to make an equitable distributing of costs to the different operations [illegible] the actual man days expended on each type were used as a basis for prorating the subsistence and overhead charges. The result is shown by the following tabular statement:

Table No. II.

Cost Statement of Oregon Eradication - 1925

Type	Acres Worked	Ribes per Acre	Cost of Type	Cost per Acre	Cost per Ribes Bush
Creek	296	174	2424.71	8.19	$0.047
Brushy Burn	34	34½	114.27	3.36	.097
Open Mature Timber	811	2¾	505.30	0.62	.225
Transitional	286	42	931.91	3.26	.077
Brushy Mature Timber	93	15¼	221.30	2.38	.156
Reproduction and Brush-Patchy	67	4	79.65	1.19	.297
Bottom Land - Mature Timber	287	5¾	303.38	1.06	.184
Total and Weighted Averages for all Types	1,874	37½	4580.52	2.44	$0.065

Pine Values on Area

The pine values protected from Blister Rust by the eradication performed may be better understood by dividing and classifying them. The following tabular statement shows per acre for each eradication type:

1. Bd. Ft. mature sugar pine
2. Bd. Ft. mature white pine.
3. Percentage of total stand made up by (1) and (2).
4. Combined number of sugar and white pine seedlings and saplings per acre.
5. Percentage of total reproduction made up by (4)

Table No. III.

Pine Values Protected

Eradication Type	Acres Pro- tected	1. Bd. Ft. Sugar Pine	2. Bd. Ft. White Pine	3. Per- centage	4. Repro- duction	5. Percentage
Creek	296	2,305	2,867	12%	84	5%
Brushy Burn	34				112	9%.
Open Mature Timber	811	13,641	358	30%	219	12%
Transitional	286	9,529	683	34%	310	15%
Brushy Mature Timber	93	20,686		24%	266	14%
Reproduction and Brush Patchy	67	4,669		10%	53	1%
Bottom Land & Mature Timber	287	5,219	4,600	18%	110	16%

The total mature white and sugar pine timber on the 1874 acres is seen to be approximately twenty one million board feet. It is not a function of this report to attempt an accurate evaluation of this timber but at an arbitrary estimate of $5.00 per M. the value would be over $100,000.00.

The comparison of value between the pine and other species composing the stand is so decidedly in favor of the pine that any management plan that may be applied will surely favor the regeneration of the pine. The percentage of white and sugar pine composing the futurestands will increase in direct ratio to the intensity of management applied.

In connection with this report a note of appreciation should be given the Forest Service. The officials of District 6 were of material assistance in selection of the location for the project and in the purchasing of supplies. The willing helpfulness of both the office force and the field personnel of the Crater National Forest showed a fine spirit of cooperation.

Checking Efficiency of Eradication
Oregon
by
J. L. Bedwell, Assistant Pathologist

Organization of Work:

In order to have an impartial check by a disinterested person, the Oregon eradication was checked under the supervision of the methods project leader as was done on the Idaho work. Two trips were made to the eradication area during the season and all completed work was checked.

Method of Work Employed:

The eradication blocks were delimited to conform with types so that a block contained only one eradication type. In checking the work it was possible, therefore, to obtain checks on each type separately.

Check strips one rod wide were run through each type so as to encounter average conditions and of sufficient length to give a 2% check of the type. The strip was run by a two-man crew, the recorder and an assistant, the same as was done in the Idaho checking work. Data were recorded on the same field sheets, forms 11 and 12, as in Idaho. Lines were run along the creek with one bank of the creek as the outside boundary.

Efficiency of Eradication by Types:

Table No. 1 gives the results of the checking on types. The Open Mature Timber Type and the Reproduction and Brush Patchy Types were not checked as the crews found four or less Ribes per acre on them. The percentage efficiency was very good on all types but on the Brushy Mature Timber Type. The large number of *Ribes sanguineum* bushes in admixture with fairly dense brush from which the *R. sanguineum* bushes could not be readily distinguishable accounts for most of the misses, which were all large bushes. On the basis of number of bushes missed per acre the work on this type was good, as missed bushes totaled 4.8 per acre.

Table No. 1.
Results of Checking on Eradication Blocks
Oregon

Type	Area of Type	% of Type Checked	No. of Ribes Pulled per Acre	No. of Ribes Missed per Acre			% Efficiency of Eradication		
				All Bushes	Over 6"	Over 1'	All Bushes	Over 6"	Over 1'
Creek	296	2.0	174.00	7.9	4.0	2.1	95.66	97.78	98.87
Brushy Burn	34	2.0	34.50	7.3	4.4	2.9	82.54	88.69	92.25
Open Mature Timber	811	0.0	2.75						
Transitional	286	2.0	42.00	8.5	4.8	1.9	83.17	89.89	95.68
Brushy Mature Timber	93	2.0	15.25	4.8	4.8	4.8	76.06	76.06	76.06
Reproduction & Brush Patchy	67	0.0	4.00						
Bottom Land Mature Timber	287	2.0	5.75	.7	.7	0.0	89.15	89.15	100.00
Totals and Averages	1874		37.48				86.91	90.68	95.92

Efficiency of eradication by species:

A tabulation of the percentage of efficiency by species according to height classes is shown in Table No. 2.

Table No. 2.
Eradication Efficiency by Species

Percentage efficiency of Eradication											
All Bushes				Over 6 inches				Over 1 foot			
sang.	lac.	lobbii	cereum	sang.	lac.	lobbii	cereum	sang.	lac.	lobbii	cereum
93.72	94.88	99.95	80.00	94.82	97.18	99.95	80.00	97.34	97.97	99.95	80.00

The low efficiency of R. cereum is due to the fact that only five bushes were found during the season, counting the one bush checked.

Cost of Checking Oregon Eradication:

The cost of checking the areas eradicated in Oregon is shown in Table No. 3.

Table No. 3.
Cost of Checking Efficiency of Eradication
Oregon

Cost of Checking				Acres checked	Cost per Acre
Salary	Transportation	Subsistence	Total		
$180.69	$94.75	$43.47	$318.91	1874	$0.17

The salary, transportation, and subsistence of the method field supervisor is included as well as that of the men used on the checking work. The cost per acre is higher than in Idaho because of the small acreage against which to distribute the cost.

Conclusions:

From the standpoint of methods employed and efficiency obtained in conjunction with the low cost per acre the Oregon eradication during this season represents a high class piece of work. In addition to the actual eradication accomplished and methods developed some excellent training was given to a group of young foresters which will be a decided asset to future work in the Oregon and California sections.

V.
Reconnaissance

Oregon - On National Forests
by
Percy E. Melis - Junior Forester.

The object of any Reconnaissance is to secure basic information in a usable form. The need of information directly applicable to our work has been and still is, one of the strongest felt requirements in the Blister Rust Control work. Reconnaissance in Oregon was taken up with the definite idea of obtaining information upon which to plan and promote the development of Blister Rust Control work. The developing and improving of methods for obtaining the above data was also an important objective.

The reconnaissance work may well be divided into two phases:

(1) Eradication Reconnaissance.
(2) Preliminary Reconnaissance.

Eradication Reconnaissance

The purpose of this work was to obtain data of direct value to the current season's eradication work.

Using the public land surveys as a basis, a map of the entire area to be eradicated was made. Control lines were run along section lines through the center of the area and the entire area mapped and typed by the strip system. Box compasses were used in running lines; while trailer tapes and topographic Abneys were used for measuring distances and elevations. The strips were run at ten chain intervals and the topographic and vegetative data carefully taken.

These notes were compiled and a large scale map showing drainage, topography, trails and vegetative types was immediately built up. This map was of very great value in planning and executing the eradication work. It was used as a base map upon which the eradication scouts plotted the progress of the work. The map was used to scale off the area of the various eradication types and working units, and in that way was used as a basis for computing the number of Ribes per acre and acres per day eradicated. (A copy of this completed map is included in the report on eradication).

As the eradication season drew to a close the entire area eradicated was cruised by eradication types. Five per cent of the area of each type was accurately tallied and the following tabulated data obtained:

Table No. IV.

Timber Summary of Protected Areas

Eradication Type	Bd.Ft. by Species per Acre: W. W. Pine	Sugar Pine	Doug. Fir	Other Species	Acres Protected	Reproduction by Species per Acre: Combined W.W.&Sugar Pine	Doug. Fir	Other Species
Creek	2,867	2,305	23,983	5,026	296	84	466	1,196
Brushy Burn			14,262	687	34	112	880	398
Open Mature Timber	358	13,641	26,287	6,941	811	219	566	990
Transitional	688	9,529	15,914	3,287	286	310	564	1,133
Brushy Mature Timber		20,686	56,405	5,428	93	266	873	762
Reproduction and Brush - Patchy		4,669	36,750	2,948	67	53	3,776	1,527
Bottom Land Mature Timber	4,600	5,219	44,427	5,240	287	110	141	434

(White Fir, Yellow Pine, Incense Cedar and Hemlock occur in this order and constitute the columns headed "Other Species.")

This table shows the actual timber and reproduction per acre, by eradication types, of the protected area.

It is apparent from the cruise that Douglas Fir is the leading species in gross scale in this timber type. It may well be considered the only competitor of the pines, for the Hemlock, Incense Cedar and White Fir are of very little value. Even the Douglas Fir in this locality is valued at less than one-half the stumpage valuation of the Sugar Pine.

Table No. V.

Pine Percentages on Protected Areas

Eradication Type	Bd. Ft. per Acre West. White & Sugar Pine Combined	Percentage of Total Stand	Percentage of Total Reproduction	Acres Protected
Creek	5,172	12%	5%	296
Brushy Burn			9%	34
Open Mature Timber	13,999	30%	12%	811
Transitional	10,217	34%	15%	266
Brushy Mature Timber	20,686	34%	14%	93
Reproduction and Brush-Patchy	4,669	10%	1%	67
Bottom Land Mature Timber	9,819	18%	16%	237

The above table shows the proportional relationship of the Blister Rust host trees to the total stand, in both merchantable timber and reproduction.

Two lines of silvicultural thought are strongly supported by these data: (1) the white and sugar pine form a decidedly larger percentage of the mature stand than they do of the reproduction. This is evidence to show that after the seedling stage is passed these pines are comparatively very hardy and thrifty. (2) The comparatively low percentage of White and Sugar Pine reproduction in the Creek, Burn, and Reproduction eradication types show these species to be better adapted to conditions under the natural forest cover than in the openings. This is not surprising in view of the known exacting requirements of Sugar Pine reproduction.

This entire eradication reconnaissance is of particular value to Local Control work where conditions of country and stand are not known. It gives a basis for planning and developing a definite program for the work and it serves as a basis for and an aid to the keeping of accurate records of accomplishment. At least as long as Ribes eradication is in an experimental stage this type of eradication reconnaissance should be included as a definite part of each eradication project.

Preliminary Reconnaissance

The purpose of this work was to determine the quality and reproduction conditions of the Oregon Sugar Pine stands; to ascertain the amount and species of Ribes in the above stands; to secure information preliminary to the selection of locations for future experimental eradication projects; and to obtain data indicative of eradication factors to be encountered.

The Forest Service records and personnel were of great assistance in carrying on this work. Type maps were studied to find the extent and limits of Sugar Pine stands. District Rangers and other Forest Service men were interviewed to find the areas of Sugar Pine concentration and to find areas representing average conditions of stand, brush and reproduction. In some instances cruises were also available to assist in the selection of areas for study.

The procedure followed when an area had been selected was to make an intensive plot study of a representative part of the area, and with this plot as a basis, make an extensive scouting study of the entire area. Plots of one section in size were usually taken and were studied by the standard strip system, once through a forty. Field forms showing data taken on the strips are herewith included.

Studies of the following districts were made:

1.	Panhandle	Crater National Forest
2.	Lodgepole	Crater National Forest
3.	Big Elk	Crater National Forest
4.	Clover Creek	Crater National Forest
5.	Pinehurst	On private lands just south of Crater National Forest
6.	Applegate	Adjoining areas in Crater and Siskiyou National Forests.
7.	Hutton R. S.	Crater National Forest
8.	Tiller	Umpqua National Forest

(See Forest Service map included herewith for exact location of these areas).

The appended field reports by Paul S. Pieper, Agent, give in detail the findings on each of the above studies.

These reports can not well be summarized as regards general findings for each report is in itself a synopsis of the conditions of a distinct locality. But, with the exception of the Applegate district, the areas studied were found for various reasons to be unsuitable for experimental eradication. Certain parts of the Applegate

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Studies of the following districts were made:

1.	[illegible]	[illegible]
2.	[illegible]	[illegible]
3.	[illegible]	[illegible]
4.	[illegible]	[illegible]
5.	Pinehurst	On private lands just south of [illegible]
6.	Applegate	Adjoining areas in Crater and Siskiyou National Forests.
7.	Putton R. S.	Crater National Forest
8.	[illegible]	[illegible]

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district, however, represent favorable conditions of sugar pine growth and reproduction with an unfamiliar association of Ribes. Near Oregon Caves there is an area of immature sugar pine comprizing 50% of the stand; the Ribes association consists of R. lacustre, G. lobbii, R. sanguineum and R. viscosissimum distributed quite generally over the area.

By the preliminary reconnaissance, as conducted this past field season, a great deal of valuable information is obtained and a very extensive area is covered. A general knowledge of the sugar pine stand and the associated Ribes has been obtained for the entire Crater National Forest, and a little adjoining territory. This general knowledge is meagre indeed, and should be supplemented when possible, but is a very promising start toward familiarity with control conditions.

This type of work should be gradually developed and extended. From a geographical standpoint, the Siskiyou and Klamath National Forests should be worked next year. The same general methods of work and procedure should be followed; particular emphasis being placed on the collection of all available information from the Forest Service so as to avoid duplication of work.

The total cost of the Reconnaissance work in Southern Oregon was $954.57, distributed as follows:

Salary	$573.31
Meals in camp	87.78
Auto hire	78.33
Travel expenses for men	215.15
TOTAL	$954.57

Due to the fact that the work was performed as one unit of operation, an exact separation of the costs of eradication reconnaissance from preliminary reconnaissance is impractical. It would be a very close approximation to charge eradication reconnaissance with one-fourth of the total and the remainder to preliminary reconnaissance.

Eradication reconnaissance	$238.64
Preliminary reconnaissance	715.93
TOTAL	954.57

district, however, represent favorable [illegible] and reproduction with an unfamiliar association of Ribes. Near Oregon Caves there is an area of [illegible] of the stand; the Ribes association consists of R. lacustre, G. lobbii, R. sanguineum and R. viscosissimum [illegible] area.

By the preliminary reconnaissance, as conducted this past field season, a great deal of valuable information is obtained and a very extensive area is covered. A general knowledge of the sugar pine stand and the associated Ribes has been obtained for the [illegible] National Forest, and a little adjoining territory. This general knowledge is meagre indeed, and should be supplemented when possible, but is a very promising start toward familiarity with control conditions.

This type of work should be gradually developed and extended. From a geographical standpoint, the Siskiyou and Klamath National Forests should be worked next year. The same general methods of work and procedure should be followed; particular emphasis being placed on the collection of all available information from the Forest Service so as to avoid duplication of work.

The total cost of the Reconnaissance work in Southern Oregon was $954.57, distributed as follows:

Salary	$573.31
Meals in camp	87.78
Auto hire	78.33
Travel expenses for men	215.15
TOTAL	954.57

Due to the fact that the work was performed as one unit of operation, an exact separation of the costs of eradication reconnaissance from preliminary reconnaissance is impractical. It would be a very close approximation to charge eradication reconnaissance with one-fourth of the total and the remainder to preliminary reconnaissance.

Eradication reconnaissance	$238.64
Preliminary reconnaissance	715.93
TOTAL	954.57

RIBES SHEET

Area T. R. S. ¼S. (40)

Date 192 Recorder Strip No.

Chains	Feet L. S.	Ht. in Feet 1	2	3	4	up	Ht. in Feet 1	2	3	4	up	Ht. in Feet 1	2	3	4	up	Den. Brush	Den. Rep.	Remarks
20	1																		
	10																		
	50																		
	up																		
18	1																		
	10																		
	50																		
	up																		
16	1																		
	10																		
	50																		
	up																		
14	1																		
	10																		
	50																		
	up																		
12	1																		
	10																		
	50																		
	up																		
10	1																		
	10																		
	50																		
	up																		
8	1																		
	10																		
	50																		
	up																		
6	1																		
	10																		
	50																		
	up																		
4	1																		
	10																		
	50																		
	up																		
2	1																		
	10																		
	50																		
	up																		
Total	1																		
	10																		
	50																		
	up																		

TIMBER SHEET

Area T. R. S. ¼S. (40)

Date 192 Compassman Strip No.

Chains	Rep. W.P.	Rep. Other	D.B.H.	Tree Species W.P.							Remarks (Exposure)
20			2								
			3								
18			4								
			5								
16			6								
			7								
14			8								
			9								
12			10								
			11								
			12								
			14								
10			16								
			18								
			20								
			22								
8			24								
			26								
			28								
			30								
6			32								
			34								
			36								
			38								
4			40								
			42								
			44								
			46								
2											

SUMMARIES

Site Study				Distribution	
Species	Age	D.B.H.	Ht.	W.P.	Scattered
					Patchy
					Dense
				Ribes	Scattered
					Patchy
					Stream
					Rock

Ground Cover

Brush		Reproduction	
Genera	Distribution	Species	Distribution
	Uniform		Uniform
	Patchy		Patchy
	Dense		Dense
	Ave.Ht.		Ave.Ht.
	Density %		Density %

Rock		Windfall	
Outcrop		Light	
Ledge		Moderate	
Boulders		Heavy	
Talus		Ave.Ht.	
% area covered			

Summary-W.P.Type

Age Class	Acres	% Stocking	Ribes per Acre

Timber (W.P.Type)

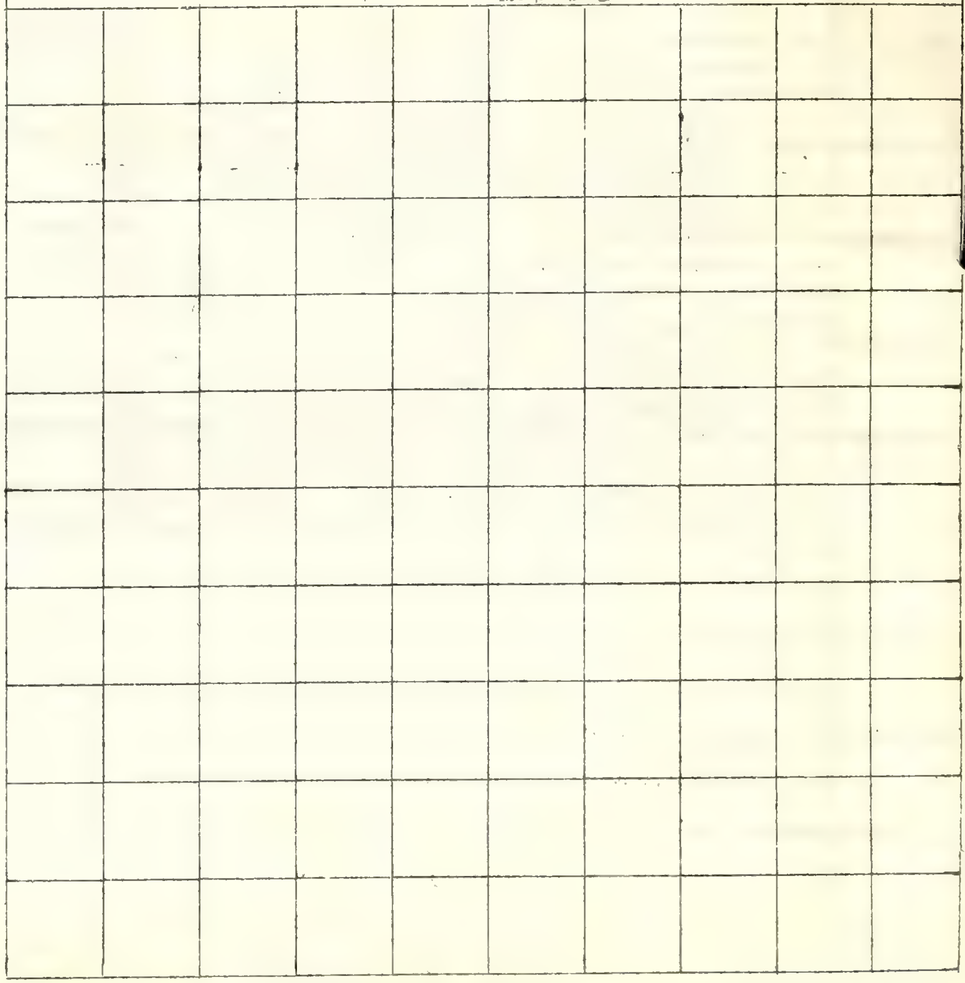
	Reproduction		Poles 2" - 8"		8" - Up	
	No.	%	No.	%	No.	%
W.P.						
Other						
Total						

Owner Address

Map (Topography (Age-Class (Timber Type

Course Degrees
Starting Point

Map Scale 1 in.= 4 Chains



.... = Stream type limits
-.-.-.-.-.-.- = Timber type limits
------------- = Age Class limits

1. Panhandle District - Crater National Forest
by
Paul S. Pieper, Agent

Intensive and extensive Reconnaissance in and adjacent to Sugar Pine type on east slope of Cascades in the vicinity of Pelican Bay Lumber Company, Kirkford, Oregon.

PLOT STUDY

The intensive Reconnaissance was carried on in the west half of Sec 7, T 31 S, R 7 E and the east half of Sec 12, T 31 S, R 7½ E. These two half-sections are adjacent to each other and were selected because they represented typical Sugar Pine type. The data gathered were: 1. Amount of reproduction (Sugar and White pine was counted in one group and all other species in another), 2. Amount and kind of brush and, 3. Topography. Notes were taken on rocks and windfalls, no cruise of the timber was made, the Forest Service cruise as contained in the records of Forest Service Office in Medford, Oregon, being accepted as correct. This decision was reached after learning that the Forest Service scalers at the Pelican Bay Lumber Company were scaling within three per cent of the cruise.

The area, which is from 4550 to 5650 feet in elevation, is generally east slope and fairly open, although there are patches of moderately dense brush. This consists, for the greater part, of Ceanothus velutina, followed by Castanopsis chrysophylla and Arctostaphyllos spp. Sage brush is in evidence over almost the entire area and thickets of lodgepole pine were encountered. About two per cent of the area contains boulders and large rocks. This is especially evident at the higher altitudes. The soil is pumice and loose volcanic ash. This did not lack moisture, for it was found that upon kicking the top soil loose during any part of the day there was considerable moisture.

Yellow pine is scattered pretty evenly over the entire area as was also Sugar pine, except in the latter case there was little or none in the plots and lower elevations. Red fir (Abies magnifica) is found, generally, above 5000 feet. A few White pine (P. monticola) were observed at the higher elevations. A few Douglas fir were found on the south east corner. The trees, on a whole, are not tall, 110 feet being about the average for heights for both Sugar and Yellow pine. Red fir exceeded this by from 10 to 20 feet. The latter grows with an even taper to the tip, while the Sugar and Yellow pines in almost all cases are blunt tipped at a diameter of about 10 to 16 inches. It could not be definitely determined just why this was, but perhaps it could be attributed to the site conditions or perhaps to greater exposure above the intermediate class, as it could be seen that

above this class, tress afforded very little mutual protection. It was noted that the grain of snags and windfalls are very much spiraled, becoming more so nearer the top.

No Ribes were found on the area except at one place on the extreme western edge between two hills. In this gulley clumps of R. cereum and R hallii were noted. Incidentally no Sugar pine grows here. Instead there are numerous lodgepole pine with a few scattering Yellow pine.

Reproduction of all species is scattered, generally, throughout the entire area, Yellow pine exceeding in numbers followed by Sugar pine, Lodgepole pine and Red fir. There is no reproduction of any species where the large tree of that particular species do not occur. The average height for reproduction for the entire area is about 19 inches and the average stocking is 600 per acre.

It was noted that the reproduction is the heaviest near the base of the parent trees. This is especially evident in the higher altitudes. Where the forest is more open rapid growth of reproduction is not apparent, seedlings 10 inches high being about 5 years old.

The average density for brush is about 17% and the average height is about 3 feet. This does not consider the Lodgepole pine which averages about 15 feet in height and in places is very dense.

Windfall, over the entire area, is very light. The average height is about 15 inches.

Humus and duff is lacking over the greater part of the area, especially on the slopes, and the soil is exposed.

EXTENSIVE OBSERVATIONS:

Section 7, T 30 S, R 7 E. Originally this area was a Sugar pine type followed by Yellow pine, Douglas fir, Red fir (A. magnifica) and lodgepone pine. A few White pine were found scattered on the higher elevations. Most of the area has been logged over. During the period of logging, it was found that the Sugar pine was so badly wind shaken (along the annual rings) that it had no commercial value. Consequently the Sugar pine that had not yet been felled was left standing and only the other species were taken out. Some of the Sugar pine that had been felled and bucked, along with a few Douglas fir, were left laying on the area.

The southern boundary of the section runs over the top of what is known as Look-out Butte, which is about 6000 feet in elevation. The section, therefore, has a northwest, a north and a north-east

exposure. The northern part of it lies on a flat of about 5700 feet elevation. Here the country is quite void of brush. Dense patches of Ceanothus, manzanita and Castanopsis occur over the hillside. This averages about three feet in height. Lodgepole pine thickets were encountered on the northwest slope. The top of the butte consists mainly of large rocks and boulders. A few rocks and boulders occur here and there on the hillside. Windfalls are not numerous and these will average about two feet in height. Reproduction is quite general and with the exception of lodgepole is not very tall. Very few Ribes were found. Near the top of the butte are some R. cereum and G. lobbii. A few of these are scattered also on the northwest slope. The soil consists of loose volcanic ash and pumice.

South of Section 7 & 12, T 31 S, R 7 & 7½ E, along Scott Creek. Along the creek on flats the brush is fairly dense for one chain on north side and a half chain on south side. This is composed of Salix, aspen, Alnus, sage brush and Red fir reproduction. Where the creek passes through hills there is less brush. Reproduction is Red fir and Yellow pine. There is very little Sugar pine reproduction. The large trees present are Yellow pine, Red fir and an occasional Sugar pine.

There are quite a number of Ribes scattered along the creek. These consist of R lacustre, R. cereum, G. klamathensis, and G. lobbii. Away from the creek on flats there are a great quantity of R. cereum in large bushes, with long, large roots. These are very difficult to pull. It might be well, at this time, to add that R. cereum is the prevailing Ribes of this region. It occurs everywhere on the flats in large bushes They can be seen from highways and roads in abundance. Berries are borne prolifically. It is apparent that eradication of this particular species would be very difficult.

Away from the creek in the altitudinal regions few Ribes occur, except near or on the top of hills where a few R. cereum or G. lobbii are occasionally found.

Area north of Section 7 & 12, T 31 S, R 7 & 7½ E. No Ribes were noted except between hills in small valleys where large clusters of R. cereum were found. R. hallii occur in abundance as does R. cereum. Some R. cereum was noted in lodgepole pine thickets on north slopes.

Ceanothus, Arctostaphylus and Castanopsis were encountered in thick, heavy patches at bottom of small valleys. Considerable sage brush was also noted. Reproduction of Yellow pine and lodgepole is scattered throughout, but Sugar pine reproduction is confined to the higher elevations where the older Sugar pine is found. None of the latter was noted in the valley bottoms.

Upper Bear Creek. This creek flows from the hills with a fair volume, but in the flat, lower region, it disappears entirely, being absorbed by the loose volcanic ash soil.

Through the flat country it is void of brush. Where the creek flows through hills patches of aspen were encountered. Some Salix and sagebrush was also noted. Here and there are patches of lodgepole.

A heavy undergrowth of G. klamathensis was found under the aspen. Some G. lobbii and R. cereum grow all along the creek except where it flows through the flats. No large Sugar pine or Sugar pine reproduction was noted. Yellow pine and lodgepole pine reproduction occurs practically over the entire distance covered, which was about seven miles. The country on both sides of the creek for most of the distance has been logged over.

Observations were made on Bear Butte on which the Pelican Bay Lumber Company was carrying on operations. Sugar pine was being logged, although similar to that on Look-out Butte, it was ring checked. However, it was not in the same condition as the Sugar pine on Look-out Butte. It could not be ascertained whether the Sugar pine on the area where the intensive work was done is checked or whether it is not as none of this species was felled.

2. Lodgepole R. S. District
by
Paul S. Pieper, Agent

EXTENSIVE RECONNAISSANCE, T 34 S, R 4 E, Section 7.

Practically all this section had been burned over by fire and evidence pointed toward a very hot and thorough fire. The area is exceedingly brushy although this is characteristic of the entire Lodgepole district. Mature timber is quite sparse and is more or less patchy. Species in the orderof their occurrence are Douglas fir, Sugar pine, Yellow pine, Lodgepole pine and Incense cedar. In the draws there were a few hemlock but these were so few as to be almost negligible. Although Sugar pine appears to be second in quantity this species is nevertheless rare, a few trees standing isolated here and there over the entire area. A rough guess would place the total number of Sugar pine at between 75 and 150 trees for the entire section.

On the basis of "10" brush will average about 9, the average height being about seven feet. The species in the order of their occurrence are Ceanothus, chinquapin, Salix, manzanita, hazel and maple.

There are also dense patches of reproduction, lodgepole being quite prominent in this.

Reproduction is quite general, in the order of their occurrence the species are Douglas fir, Incense cedar, Sugar pine, Lodgepole pine and Yellow pine.

Four species of Ribes prevail over the entire area. They are R. lacustre, R. hallii, R. cereum and G. lobbii.

The soil is a clayish loam with a few patches of gravelly rock.

The mature timber averages about 130 feet in height and the reproduction ranges up to 25 feet in height.

T 34 S, R 4 E, Sec. 4. Half this section is practically fully stocked with mature timber while the balance is very scattering, perhaps due to fire. The mature timber lies principally in the southern half and the species in the order of their occurrence are Douglas fir, White fir, Sugar pine, Yellow pine, White pine, and Incense cedar. The Sugar pine is limited entirely to the southern half, Douglas fir dominates scatteringly in the northern half. This half is very brushy, being about 6 or 7 on a basis of "10". The brush in order of occurrence is Ceanothus, Salix, chinquapin, Corylus, Vaccinum, Rubus and Holodiscus. Taxus occurs quite frequently but is limited to the southern half on the heavier stocked area.

Reproduction is quite general over the entire section. Douglas fir dominating, followed by White fir, Incense cedar, White pine (monticola and lambertiana) and Yellow pine.

Occurrence of Ribes is quite general, the species encountered in the order of their numbers are R. hallii, R. lacustre, G. lobbii, and R. cereum.

The soil is clayish loam. No rock were observed. No water flows through the area except during the rainy season when there is a creek draining towards the northwest. No extraordinary amount of brush occurs along this drainage. However, R. lacustre prevails here more than any other place.

The mature timber appears healthy and the Sugar pine was noted as being quite large in size.

GENERAL - LODGEPOLE DISTRICT

Sugar pine is portioned off into a number of sections, lying in no particular one. This species was found to be quite large in diameter and rather tall, growing in mixture with Douglas fir, White fir, Incense cedar, White pine and Shasta (red) fir. The latter grows only in the

higher elevations and does not occur in either sections 4 or 7.

A trip was taken to Rustler Peak, about a mile and a half south of section 4. The trail passes through the Sugar pine belt and along this trail the best species are encountered. In the lower elevations the type is Sugar pine, Douglas fir but gradually changes to Sugar pine-Red fir as the elevation increases. In the higher altitudes Sugar pine is absent. However, White pine, which is found in the lower elevation, continues to the top of Rustler Peak.

The average brush density where Sugar pine occurs is about 2, on a basis of "10".

The area north and east of section 4 contains no Sugar pine, Yellow pine being the principal species in mixture with Douglas fir and Lodgepole pine. This area is particularly brushy. In fact the entire Lodgepole R. S. District is exceedingly brushy.

Ribes are quite general and the species noted are _R. lacustre_, _R. lobbii_, _R. hallii_, and _R. cereum_. Only two streams were encountered and these are small. Other streams flow during the rainy season.

3. Big Elk R. S.

by

Paul S. Pieper, Agent

REGION OF BIG ELK R. S. (Located in T 37 S, R 4 E, NE $\frac{1}{4}$ Sec 16) It was reported that Sugar pine occurred in the area surrounding Moon Prairie R. S. but upon observation none was found. Moon Prairie R. S. lies $8\frac{1}{2}$ miles (by road) south of Big Elk R. S. This road passes through a belt of mixed timber of all age. Douglas fir predominates followed by White fir and White pine (monticola). Much of the latter is in evidence.

The only region of Sugar pine in this district is the west slope of Brown Mountain, three or four miles east of Big Elk. Although this species is exceeded in quantity only by Douglas fir, it is exceedingly scarce, also stunted in height and diameter. It is exposed to all conditions and probably as a result is very inferior as to quality. Without a doubt its highest use is in its present capacity -- that of standing timber. The area on which it exists is composed of lava rock. This lava bed extends over many sections and is practically void of soil. It was concluded that the trees secured their nourishment by forcing their roots to the soil beneath the rock. Brown Mountain itself is a huge pile of lava. However, trees are in evidence almost to the top.

A characteristic of this region is the peculiar benches by which the higher elevation of Brown Mountain is attained. On these benches is where the timber occurs. Near the edge of the tree growth on the edge of the benches are dense patches of chinquapin with an occasional patch of manzanita.

Ribes are few but appear to be general. These consist of two species -- R. hallii and R. cereum.

Reproduction is so small in quantity as to be practically negligible.

Water is entirely absent.

Eradication of this area would be exceedingly difficult and costly.

To the south the lava bed ends abruptly and here timber occurs in large quantities. However, there is no Sugar pine. This is probably due to the lower elevation. White pine occurs in an appreciable quantity. These are beautiful trees, quite large, straight, tall and free of branches for most of their length. In this area Butte Creek has its source. R. lacustre occur along this stream in great number. In the immediate vicinity of the creek there is much brush, Amelanchier and Salix being the principal species.

Away from the creek, brush does not occur as profusely and here the principal species is Taxus brevifolia. The average density is about 3 on a basis of "10".

Reproduction is quite general and it is in all stages of height growth. Some reproduction is so numerous as to form dense thickets. White pine reproduction is very much in evidence.

4. Clover Station
by
Paul S. Pieper, Agent

Region of Clover Station (Located T 38 S, R 6 E, Sec. 35) The Sugar pine in this area is found in about the central part of the township and much of it occurs on privately owned land. It does not occur regularly but is inclined to be patchy although it occurs rather scattered generally. The type varies from Sugar pine, Yellow pine type to Sugar pine White fir type, depending upon the slope. However, the former is the most prevalent. Douglas fir occurs in mixture with an occasional Incense cedar.

The Sugar pine area is covered with brush to an average density of "5". This averages about 5 feet in height and consists mainly of Ceanothus, followed by chinquapin, manzanita and Salix.

Ribes, generally are very scarce except along Spencer Creek where R. lacustre are very numerous. One R. hallii (or R. viscosissimum) was found on the west slope of Spencer creek. Lacustre occur quite frequently along Clover Creek. This stream is dry during summer.

Reproduction is quite general and in the order of their occurrence are Yellow pine, Douglas fir, White fir, Sugar pine and Incense cedar.

This area cannot be considered as a good example of Sugar pine type, being very scattered, generally, and confined to a very small area.

5. Pinehurst District
by
Paul S. Pieper, Agent

INTENSIVE RECONNAISSANCE. T 40 S, R 4 E, W ½ S 1, E ½ S 2.

This area was chosen because it contained a very high per cent of Sugar pine and also because part of it lies in a burn which took place in 1924. It lies on a gentle slope to the west from Parker Mountain. The soil is clayish loam which appears to be shallow. There are many rock-out crops pretty well scattered over the entire area.

Species occurring in the order of their numbers (over 24 inches D.B.H.) are Douglas fir, Sugar pine, Yellow pine, White fir, and Incense cedars. Sugar pine was found to be the largest tree in diameter, and has an average height of 140 feet.

Reproduction is quite general except in the burned area and averages about 1200 per acre. Douglas fir may be said to lead in the amount of reproduction and it is followed by White fir, Sugar pine, Yellow pine and Incense cedar.

Brush occurs over the entire area except the burned portion with an average density of 25%. This consists, in the order of occurence, of Ceanothus, Amelanchier, Castanopsis, Salix, manzanita and and huckleberry and is quite dense in patches. Much White fir, Douglas fir, and Yellow pine grow together to form dense thickets. In the southwest "40", especially, there is very heavy thickets of Yellow pine, interspersed by patches of Ceanothus. A few scattering mature trees occur here. Windfall, generally, is moderate.

Ribes are very scattering and generally scarce except in the eastern part of the area where numerous quantities of small G. lobbii up to 3 inches high were noted.

On this burn, which occurred in 1924, one part of which appears to have been burned a number of years before, practically all the trees are entirely killed. No reproduction is in evidence, except very occasionally a small Douglas fir was found. This does not mean, however, that the area will not be restocked, because it is quite evident that reproduction has not had time to establish itself. It would be interesting to visit this burn in the future to determine the amount of Ribes, brush and reproduction that has taken place and compare it to what is there at the present time.

This area, as is most of the land in this vicinity, is owned by the Weyerhaeuser interests. The exact elevation at the start of the base line could not be determined, but 4100 feet was conceded as being within 100 feet of correct. This was ascertained from a person who worked with the engineer in laying out the highway.

The burn of 1924 is not entirely solid except in the two southeast forties of the area. There are a number of small patches throughout the western half section 1 which are burned, very little mature timber is killed, although the reproduction and bush is destroyed.

EXTENSIVE OBSERVATIONS.

The main highway between Klamath Falls and Ashland passes about 8 chains north of the area. A trip by machine was made which surrounded about 11 sections north of the highway and due north of the area. Starting on the road about two miles east of Pinehurst Inn, Sugar pine was encountered. The stand decreased in number after a short distance and from there on to about where the road crosses the county line Sugar pine appeared in patches. Travel then was through area void of Sugar pine and composed mostly of Yellow pine with a mixture of White fir until the main highway was reached along which a few Sugar pine occurred. The species became more numerous the nearer the plot where intensive work was done.

A trip was then made by foot through part of the area directly north of the plot. The result of the trip may be summarized as follows:

1. No Ribes were found. This does not mean no Ribes are on the area but that they are quite scarce.

2. Brush is about the same density as is on adjacent halves of sections one and two, except that no large thickets of reproduction were encountered.

3. Reproduction of all species quite general although Sugar pine was not so plentiful as on section one and two. In the order of occurrence

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[illegible]

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3. Reproduction of all species quite general although Sugar pine was not so plentiful as on section one and two. In the order of occurr-

Douglas fir, White fir, Sugar pine, Incense cedar and Yellow pine.

4. Sugar pine not so numerous, perhaps ½ to 2/3 the stocking as occurs on section one and two. This may account for smaller amount of Sugar pine reproduction. Mature trees about the same size as occurs on sections one and two.

5. Ground rolling, a few boulders and rock out-crops, no creeks, drainage toward Jenny Creek.

6. Species in order of occurrence are Douglas fir, White fir, Sugar pine, Incense cedar and Yellow pine.

It can be safely said that further north Sugar pine fails to occur since the investigations around Moon Prairie, R. S. showed there was none in that area.

A trip was made around the adjacent halves of sections one and two. Starting in from the highway about where the line dividing two and three crosses, the journey was south for about two miles, then across to the top of Parker Mountain then north to the highway.

East of the area conditions exist practically the same as on Sections one and two as far as the amount of Sugar pine, mixture of species, reproduction, brush conditions, type of country and amount of and kind of Ribes are concerned. A few bushes of G. lobbii occurred but these are very scattering although of fair size. North of the area for half a mile Sugar pine becomes less in numbers although well scattered. About a mile from Parker Mountain the burn of 1924 was encountered. In this burn practically all of the reproduction is killed as well as the mature trees. Patches of green trees were passed through and many of these were badly scorched, indicating that a further mortality is probable. Some green trees of all species were noted.

The area is rocky, generally and becomes much more rocky as the elevation of Parker Mountain increases. All under growth was killed for the ground was burned very thoroughly. However, it is expected that this brush will grow again in increasing quantity.

Only one species of Ribes was noted. This is G. lobbii and evidence points toward a great quantity of this species in the future, Small plants up to three inches high were quite general any may be said to be slightly patchy for on the eastern side of the burn large numbers of small plants were noted around the parent stem. The top of Parker Mountain was void of timber except for a few stunted Douglas fir.

Going north from the mountain to the highway the burn was still in evidence, although not so intense as on the west side and the nearer the road the less was the burn and the more patchy it occurred.

Dense patches of Ceanothus were found some of which were completely destroyed by the fire. Reproduction of all species is quite general where the area had not been troubled by the fire. As for reproduction, mixture of species, amount of timber, the same conditions exist here as on the area where intensive work was done. The brush, composed chiefly of Ceanothus, appeared to be much more in evidence. G. lobbii, a few old stalks and numerous young plants were generally noted excepting within a half mile of the highway where none at all were seen.

Along the Klamath Falls-Ashland Highway for a distance of about 25 miles east of Keene Creek Sugar pine occurs quite generally although there are a few spots where no Sugar pine was seen. It grows in mixture with Douglas fir and Yellowpine principally but most of it is a Douglas fir, Sugar pine type, while a small per cent is Yellow pine, Sugar pine type. Reproduction of Sugar pine seems to be quite general. West of Pinehurst a great number of G. lobbii and R. sanguineum were noted along the road.

In the vicinity of Pinehurst Sugar pine occurs rather sparingly with none along Jenny Creek and Beaver Creek. However, it undoubtedly occurs along Jenny Creek around Fredenburg Springs. G. lobbii was found all along both of these creeks and a quantity of R. sanguineum was also found along Beaver Creek. Beaver Creek is comparatively free of brush, while Jenny Creek is quite brushy in places for a distance of two chains on either side. This brush consists mainly, in the order of their occurrence, of Crataegus, Salix, Prunus and Alnus. A distance of about 2 miles was travelled up Jenny Creek. The closest Sugar pine within the distance occurred about 150 yards from the creek. Along the Klamath Falls-Ashland highway Sugar pine occurs quite generally although there were a few spots where no Sugar pine was seen.

6. Applegate District
by
Paul S. Pieper, Agent

GENERAL RECONNAISSANCE - Area west of Steamboat which is in T 40 S, R 4 W, Wm. M, Section 21.

By trail up Sturgis Fork to Oregon Caves, then back along ridge at edge of Crater National Forest to head of Sucker Creek, then east down a fork of Steve Creek, down Steve Creek to Steamboat.

The valleys and canyons of this area is where most of the timber is found. The ridges and higher elevations are almost void of timber except for a few patches of alpine and Red fir. Sugar pine is quite general in this area on each side of the creek to an elevation of about 4500 feet. Scattering trees occur all over, but patches of fairly dense stocking were encountered. Up Sturge's Fork this species is quite

numerous but most of the trees are short and under 36 inches D. B. H. The trees are very limby and as a result not very good as to quality.

However, where fire has been kept out the future of Sugar pine is very promising. This statement can be applied generally. Where there has been no fire Sugar pine can be found in all stages of growth. Where fire has been in the area, only the larger trees are found. Reproduction of Sugar pine, on the whole, is not prolific, although fairly general. It is more or less patchy and may be found in greatest numbers where brush has not crowded it out. Growth of reproduction appears to be excellent especially where there is only partial shade. On the south slope of Sturge's Fork there has been a fire and very little reproduction was observed. This comprises a considerable abount of the area away from the immediate vicinity of the creek.

The best Sugar pine is up Steve Fork where reproduction is fairly numerous and trees in all stages of growth are in evidence. Fire has not swept this area as in other localities.

Near Oregon Caves there is a very fine stand of growing Sugar pine. The area is quite narrow, although a few of the species occur sparingly around it. This Sugar pine stand has not yet reached maturity. It comprises about 50% of the species in mixture. Other species are Douglas fir, White fir, Incense cedar and Port Orford cedar, mentioned in the order of their relative numerical quantity. Considerable Sugar pine reproduction was noted in mixture with Douglas fir, White fir, Incense and Port Orford cedars. The Ribes noted here are R. lacustre, G. lobbii, R. sanguineum and R. viscosisimum. These occur quite generally.

Species in mixture in the Sturgis and Steve Fork country are, in order of occurrence, Douglas fir, White fir, Sugar pine, Incense cedar and Yellow pine. In the higher elevations mixture of Red fir, Alpine fir and a very few White pine may also be found.

Reproduction in the order of its occurrence is Douglas fir, White fir, Incense cedar, Sugar pine and in the higher elevations considerable Red fir seedlings.

Brush averages about "3" and consists of Acer, Ceanothus, manzanita, Castanopsis, Salix, Corylus, ocean spray, Holodiscus and some Taxus.

Ribes are very numerous and quite general. These consist of R. lacustre, (mostly along creeks and wet places) R. sanguineum, R. viscosisimum, G. lobbii, G. cruenta and G. marshallii. This last occurs only in the higher elevations on ridges above 4500 feet.

The country, generally, is exceedingly rough. Canyons are numerous. The ground is steep with slopes of 35% and greater. Rocks

numerous but most of the trees are short and under [illegible] inches D. B. H. The trees are very limby and as a result not very good as to quality.

However, where fire has been kept out the future of Sugar pine is very promising. This statement can be applied generally. Where there has been no fire Sugar pine can be found in all stages of growth. Where fire has been in the area, only the larger trees are found. Reproduction of Sugar pine, on the whole, is not prolific, although fairly general. It is more or less patchy and may be found in greatest numbers where brush has not crowded it out. Growth of reproduction appears to be excellent especially where there is only [illegible] [illegible] a fire and very little reproduction was observed. This comprises a considerable amount of the area away from the immediate vicinity of the creek.

The best Sugar pine is up Steve Fork where reproduction is fairly numerous and trees in all stages of growth are in evidence. Fire has not swept this area as in other localities.

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Species in mixture in the Sturgis and Steve Fork country are, in order of occurrence, Douglas fir, White fir, Sugar pine, Incense cedar and Yellow pine. In the higher elevations mixture of Red fir, Alpine fir and a very few White pine may also be found.

Reproduction in the order of its occurrence is Douglas fir, White fir, Incense cedar, Sugar pine and in the higher elevations considerable Red fir seedlings.

Brush averages about 8" and consists of Acer, Ceanothus, [illegible], Castanopsis, Salix, Corylus, ocean spray, [illegible] and some Taxus.

Ribes are very numerous and quite general. These consist of R. lacustre, (mostly along creeks and wet places) R. [illegible], R. [illegible], R. lobbii, R. [illegible] and R. [illegible]. [illegible] occur only in the higher elevations on ridges above [illegible] feet.

The country, generally, is exceedingly rough. Canyons are numerous. The ground is steep with slopes of 25% and greater. Rocks

abound in profusion from fine gravel to huge boulders forming cliffs. Elevations range from 2300 feet to 5500 with peaks extending to 7000 feet. Soil is generally shallow and varies from clay to a fairly rich loam. However it is mostly a mixture of the two.

Brush is found along the creek to a width of at least one chain on either side. Here is where most of the _Acer_ is found and here also are many poplars in all stages of growth from reproduction to trees three feet in diameter.

7. Hutton R. S. District
by
Paul S. Peiper, Agent

EXTENSIVE RECONNAISSANCE, South of Hutton R. S. which is in T 19 N, R 11 W, Humbolt M, Section 21.

Area covered was from Hutton by trail past the Blue Ledge mine to the summit of the Siskiyou, than along the summit to a point south of Dutch Creek, then to Dutch Creek and down the creek to Elliot Creek, then to Hutton.

On the trail up to the summit and along Elliot Creek were found some Sugar pine. These are stunted in growth and appear to be very inferior in quality. It is mostly west exposure except along Elliot Creek and this is south exposure. The species in mixture are Yellow pine, Douglas fir, White fir, Sugar pine and Incense cedar. Approaching the summit there is no Sugar pine. There are a few White pine and these are tall, straight and appear of good quality. However, timber is generally scarce on the summit and consists mainly of Red fir, some Douglas and White fir and Mountain hemlock.

Reproduction is quite scarce along the trail and Sugar pine especially so, therefore, nothing much can be expected of Sugar pine in the future. Reproduction in order of occurrence is: Yellow pine, White fir, Incense cedar, Douglas fir and Sugar pine.

Brush is very dense almost generally. This consists of _Ceanothus_, _manzanita_, _Castanopsis_, _Quercus_ and _Salix_. This applies to the region along the trail to the summit. Brush is not quite so dense along the south side of Elliot Creek and along the summit, however, of about the same mixture.

To Elliot Creek by way of Dutch Creek, the timber is very much better and the mixture consists in order of occurrence, of Douglas fir, White fir, Suger pine, Incense cedar and Yellow pine. The Sugar pine is more numerous and of much better quality than along the

abound in profusion from fine gravel to huge boulders forming cliffs. Elevations range from 2800 feet to 5500 with peaks extending to 7000 feet. Soil is generally shallow and varies from clay to a fairly rich loam. However it is mostly a mixture of the two.

Brush is found along the creek to a width of at least one chain on either side. Here is where most of the yew is found and here also are many poplars in all stages of growth from reproduction to trees three feet in diameter.

[illegible]
by
[illegible]

EXTENSIVE RECONNAISSANCE, South of Hutton R. S. which is in T 19 [illegible]
[illegible]

Area covered was from Hutton by trail past the Blue Ledge mine to the summit of the Siskiyou, then along the summit to a point south of Dutch Creek, then to Dutch Creek and down the creek to Elliot Creek, then to Hutton.

On the trail up to the summit and along Elliot Creek were found some Sugar pine. These are stunted in growth and appear to be very inferior in quality. It is mostly west exposure except along Elliot Creek and this is south exposure. The species in mixture are Yellow pine, Douglas fir, White fir, Sugar pine and Incense cedar. Approaching the summit there is no Sugar pine. There are a few White pine and these are tall, straight and appear of good quality. However, timber is generally scarce on the summit and consists mainly of Red fir, some Douglas and White fir and Mountain hemlock.

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Brush is very dense almost generally. This consists of Ceanothus, manzanita, Castanopsis, Quercus and Salix. This applies to the region along the trail to the summit. Brush is not quite so dense along the south side of Elliot Creek and along the summit, however, of about the same mixture.

To Elliot Creek by way of Dutch Creek, the timber is very much better and the mixture consists in order of occurrence, of Douglas fir, White fir, Sugar pine, Incense cedar and Yellow pine. The Sugar pine is more numerous and of much better quality than along the

Blue Ledge mine trail. The exposure is north generally. Reproduction is fair. However, Sugar pine is quite scarce. In the order of occurrence is Douglas fir, White fir, Incense cedar, Sugar pine, Yellow pine.

Ribes are very general and numerous. The species are R. viscosissimum, G. lobbii, R. lacustre, R. sanguineum, G. cruenta, and G. marshallii. This last grows only in the higher altitudes alone 4500 feet.

The country is very much broken up. Ridges are numerous. The ground is quite rocky and steep. There are a number of small streams and R. lacustre occurs quite abundantly. The soil is shallow and consists mostly of a clayish loam.

The timber seems to grow best on the north slope.

The brush from the summit to Elliot Creek is not so dense except in patches. This is a mixture of Acer, Quercus, Castanopsis, Ceanothus and some Salix and manzanita.

8. Tiller District
by
Paul S. Peiper, Agent

EXTENSIVE RECONNAISSANCE - Tiller District, located in T 30 S, R 2 W, Section 28.

Sugar pine is found north, east and south of Tiller but in no large extensive stand as is typical of the Prospect area. A thorough search was made for a stand of Sugar pine type on which intensive data might be taken but as no such stand seems to exist it was necessary to resort almost entirely to extensive observations. Intensive data was taken on one strip through four forties, but this can not be taken as being typical of the region.

The area west, north and northeast of the Hutchison R. S. was observed. This area, as is typical of the region, is hilly and and broken up by canyons, some of which are quite steep. The altitude is about 1400 feet to 1800 feet. The forest is not complete, being broken up by numerous clearings, both natural and man made. The trees consist in the order of occurrence, of Douglas fir, Yellow pine, Sugar pine, White fir, Incense cedar, and hemlock. Douglas fir is general but the Yellow pine, and Sugar pine is very patchy. Sugar pine occurs in small patches which are distinctly a Sugar pine-Douglas fir type. These trees appear of good quality, large and tall and are over-mature.

The timbered area is not very bushy. There are some Acer,

[illegible] pine trail. The exposure is north generally. Reproduction is fair. However, Sugar pine is quite scarce. In the order of occurrence is Douglas fir, White fir, Incense cedar, Sugar pine, Yellow pine.

Ribes are very general and numerous. The species are [illegible], [illegible], [illegible], [illegible], [illegible] and [illegible] marshallii. This last grows only in the higher altitudes 4500 feet.

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The timber seems to grow best on the north slope.

The brush from the summit to Elliot Creek is [illegible] except in patches. This is a mixture of Acer, Quercus, [illegible], Ceanothus and some Salix and manzanita.

[illegible]

[illegible]

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The timbered area is not very brushy. There are some [illegible],

Castanopsis, manzanita, Corylus, Ceanothus, arbutus, Holodiscus and Taxus. The untimbered parts of the area are more bushy. Manzanita ranks first here, followed by Castanopsis, Ceanothus, Cornus and Holodiscus.

Reproduction is general except under the very heavy canopy of the forest and in some of the open country. This consists of Douglas fir, White fir, Sugar pine, Yellow pine, Incense cedar and hemlock.

Ribes are very scattering but can be expected to be found almost generally, especially in the open and along the road. The species are G. lobbii, R. sanguineum and G. cruenta.

Rocks of all sizes from pebbles to huge boulders occur generally, covering from 10 to 25% of the area.

An area in the vicinity of the corner of sections 7, 8, 17 and 18 was examined. Here is a small patch of Sugar pine-Douglas fir type -- too small to consider as a plot. However, the Sugar pine appears to be of very fine quality and where it does exist it competes well with Douglas fir for quantity. Other species in mixture are Incense cedar, White fir and Yellow pine, in order of occurrence. There is little brush and this consists mostly of Acer, with some Taxus. Acer is very dense along the creek. Very few Ribes were noted and these are R. sanguineum and G. lobbii. The ground is fairly level except along the creeks, which are usually found in moderately steep canyons. Rocks occur generally and these are of all sizes. The elevation is around 3800 feet.

T 29 & 30 S, R 2 W, (north of Tiller) was investigated. Here there is much Sugar pine but similar to other areas in this district it occurs in small patches, principally on ridges. The trees are ordinarily of large diameter and very tall, although there are trees of all ages. A few defective trees are found, perhaps more than on any area so far visited. Trametes pini is the principal source of rot.

Sugar pine along the trail to Windy Camp lookout is very scarce. Douglas fir is the principal species. This is young, very numerous, straight, of good quality, tall, and void of branches for two-thirds of its length. In the balance of the area the Douglas fir is much larger and to a considerable extent infected by disease.

For the entire area, species in order of occurrence are Douglas fir, White fir, Incense cedar, Sugar pine, Western Red cedar, Yellow pine, and hemlock.

Brush is not as prevalent under the forest cover. However, it is exceptionally heavy in that portion that has been burned over.

[illegible] *Taxus*. The untimbered parts of the area are more bushy. Manzanita ranks first here, followed by *Castanopsis*, *Ceanothus*, *Cornus* and [illegible].

Reproduction is general except under the very heavy canopy of the forest and in some of the open country. This consists of Douglas fir, White fir, Sugar pine, Yellow pine, Incense cedar and hemlock.

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Rocks of all sizes from pebbles to huge boulders occur generally, covering from 10 to 25% of the area.

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Brush is not as prevalent under the forest cover. However, it is exceptionally heavy in that portion that has been burned over.

Under the forest canopy brush consists in the order of occurrence of Castanopsis, Acer, Ceanothus, Corylus, manzanita, Gaultheria, arbutus, Salix, Rhododendron, Holodiscus and Tsuga reproduction.

Ribes are very scattering and can be said to be almost patchy. These consist of G. lobbii, R. sanguineum, G. cruenta and G. marshallii. No Ribes were found under the forest canopy. They occur where there is an opening, principally around old homesteads where clearing has been done.

The elevation is about 3000 feet. The ground is broken by many ridges and shallow ravines. The soil is not very deep and rock out-crops are numerous as well as small shale-like gravel.

Reproduction is found over the entire area, being scarce only where the forest canopy is the heaviest. This consists in the order of occurrence of Douglas fir, White fir, Incense cedar, Sugar pine Western Red cedar and Yellow pine. Sugar pine reproduction is much more plentiful than its position in the list would indicate.

An area comprising sections 7, 10, 11, 14, 15, 16, 17, 18, T 30 S, R 1 W was investigated. This area is mostly reproduction with scattering patches of large trees. These consist of Yellow pine, Douglas fir, Incense cedar, White fir and Sugar pine in order of occurrence. The reproduction is almost general and consists of the same species in about the same order . However, it is difficult to say which is the more plentiful between Douglas fir and Yellow pine. The Sugar pine is very scarce, both the reproduction and the older trees. In this locality Sugar pine shows up the least compared to any locality visited in this district. Ribes are very patchy, being confined to G. lobbii on the ridge tops and a few R. sanguineum lower down. It was said by a cattle man that the lobbii is so thick as to hinder the driving of stock. Brush is very general and very heavy in patches. This consists of Quercus, manzanita, Acer Ceanothus, Corylus, Holodiscus, Castanopsis, arbutus, and Salix. This area slopes away from a ridge to the south and to the north, perhaps not to exceed 20 degrees. This slope is broken up by smaller ridges. Rock out-crops occur generally. The soil is clayish.

TILLER DISTRICT

As was shown by the investigation the region is not heavily stocked with Sugar pine. However, there is a considerable amount of Sugar pine covering a very extensive area and much of this occurs in small patches that will run a very heavy percent of Sugar pine. Most of the older trees are mature trees but there are some of all ages. It

is quite evident that Sugar pine can be made to take an important part in future timber production in this region because of the large amount of Sugar pine reproduction. While this does not grow in thicket like Douglas fir and other species, the fact that it is so general and that it competes favorably with other species as far as growth is concerned puts it in a class that must be considered a factor in the next crop of timber. Close to parent trees and at considerable distance away Sugar pine is found. In areas that have been burned many years ago, Sugar pine is making fine growth although the trees are not numerous. In the virgin timber where the forest canopy has been broken Sugar pine reproduction is found growing with other species.

Much of the land investigated is privately owned; abandoned homesteads are stocking well with reproduction.

Ribes are found in all areas. Few are found along streams or in swamps. Instead they tend to grow much more numerous in open places and old homesteads seemed to be a favorite place.

The country generally is hilly but very steep, slopes are scarce. Rock out-crops are numerous and there are some large boulders. Windfalls are not numerous.

Brush is usually quite heavy in the open and much of this is dense thickets of reproduction.

VI.

Cultivated Black Currant Eradication

by

T. D. Mallery, Agent

In as much as cultivated black currant eradication in Oregon has reached a stage where it may be deemed unnecessary to continue the eradication work by means of Federal scouts a summary report of the work which has been done together with suggestions for continuing the education of the people on Blister Rust control and for securing the eradication of any bushes which may still be present in the state should be of value.

The first step in black currant eradication work in Oregon, namely, scouting to secure the location of Ribes plantings and inspecting the bushes for Blister Rust was done by scouts in 1922. This work had considerable value in that it showed that Blister Rust was not then present in the state and also that there was present a large number of black currant plantings. However, the value of the work would have been greatly enhanced had we not attempted to cover so much territory in the allotted time for when scouts went over the same territory in 1923 to eradicate the bushes it was found that many bushes had been overlooked.

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[illegible]

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The 1923 field assistants of necessity had to rely upon the work of the previous year and therefore did not themselves get all of the plantings. Scouts of 1922 no doubt thought they were thorough. Experience has shown, however, that there is such a thing as a "scouting pace" beyond which it is unsafe to travel because of the increased possibility of passing up black currant locations. Within wide limits this "pace" is not influenced by the type of territory. It can be determined solely by experience and should be set by the man in charge of the crew. What I have termed the "scouting pace" is involved even more in scouting for infections than it is in scouting for black currant plantings because a greater amount of patience is required in the former. Should it become necessary to do preliminary scouting elsewhere as in Oregon in 1922 it would be better to scout representative isolated areas thoroughly to secure a cross- section of conditions rather than to endeavor to cover an entire area in a pre-determined time.

During the last month of the 1922 season an effort was made to secure the eradication of Ribes nigrum in Clatsop County, Oregon. This I feel was a mistake because the state had not yet consented to back up our eradication program and due to lack of proper authority some people would not give up their bushes. Others tookthem out because they got the impression that it was against the law to have them and found out later that they really did not have to remove their plantings. Such cases as these stirred up hard feelings and antagonism and made subsequent work more difficult to carry out. We should endeavor to carry out only such a program as the state in which we are working will fully support.

One of the best aids to Blister Rust control and consequently black currant eradication is showing the film "White Pine Blister Rust a Menace to White Pine Timber". This particular picture consists of two reels. A one-reel film would be better since the theatre managers would not need to schedule the film so far ahead of time in order to work it into their programs. No adverse criticism of the film mentioned above has been heard. The picture was shown at nine rather widely separated towns during the eradication season of 1925. The number of showings was limited by the number of towns and by the necessity of two crews using the same reels.

The local newspapers have also proved valuable in preparing black currant owners for visits from scouts. When the people know something of Blister Rust before the scouts call much time and energy is saved as a rule. Much care must be taken in checking up on printed articles and mistakes must be always promptly corrected. This method has been carried out in the past. The reporter who is looking for something sensational is especially dangerous and must be guarded against. Blister Rust articles should contain only the statement of facts, a short clear-cut explanation of the life cycle of the disease and possibly a slight urge for cooperation on the part of black currant owners.

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During the past season two panel exhibits were used, one by each crew. These were displayed in windows of stores and postoffices. They proved very effective in educating the people of the communities visited. The exhibits pointed out the main features in the life cycle of the disease and indicated cooperative steps for the reader. The panel exhibit has possibilities which cannot be well overlooked in the future campaigns.

Educational work through schools has been of great value in enlightening the people on the question of Blister Rust control. The more the people know concerning the disease the easier and more effective is the work of eradication. Since control of the disease will need to be practiced for many years to come if not always the education of the coming generation is imperative.

A Blister Rust text book in the form of a circular written in language adapted to primary and secondary school pupils should be a good investment.

The securing of Ribes nigrum locations through surveys conducted by pupils is of little value. The territory always has to be covered by scouts and scouts may depend too much on school census reports. In many cases people reported as having black currants never had had any. To some people the securing of locations through the schools appears to be an underhanded method.

Experience has shown that it would be folly to claim that all black currants have been removed from Oregon. I, however, do believe that the number of bushes yet remaining in the state is very small. The effort of the past to secure the cooperation and actual functioning of county agents, county fruit inspectors, fire wardens, Forest Service officials, State Board of Horticulture, newspapers and schools in the eradication program should be continued. In my opinion the proper and most efficient method of securing a continuance of black currant eradication in Oregon would be to secure the appointment of a state man who would have jurisdiction over the employees of the above named agencies and who could issue direct and specific orders to county fruit inspectors concerning their duties in connection with the control program and could carry on educational work with the other agencies of the state. In the past our connection with the field men of these cooperating agencies has been too impersonal and indirect. We have had to beg them to give ear to our supplicationsand whether they listened or whether they acted depended entirely on their vision, personal interest or sense of responsibility.

The help received from closely allied and more remote agencies in the past has been valuable and should not be belittled, however, the efficiency of this help can be increased many fold by some such method as is indicated above. In fact this cooperation under proper centralized leadership should prove sufficient aside from the various phases

During the past season two manual exhibits were used, one in [illegible] [illegible] visited. The exhibits pointed out the main features in the life cycle [illegible] exhibit has possibilities which cannot be well overlooked in the future [illegible].

Educational work through schools has been of great value in enlightening the people on the question of Blister Rust control. The [illegible] ive is the work of eradication. Since control of the disease will need to be practiced for many years to come if not always the education of the coming generation is imperative.

A Blister Rust text book in the form of a circular written in language adapted to primary and secondary school pupils should be a good investment.

The securing of ribes nigrum locations through surveys conducted by pupils is of little value. The territory always has to be [illegible] In many cases people reported as having black currants never had had any. To some people the securing of locations through the schools appears to be an underhanded method.

Experience has shown that it would be folly to claim that all black currants have been removed from Oregon. I, however, do believe that the number of bushes yet remaining in the state is very small. The effort of the past to secure the cooperation and actual functioning of [illegible] officials, State Board of Horticulture, newspapers and schools in the eradication program should be continued. In my opinion the proper and [illegible] cation in Oregon would be to secure the appointment of a state man who would have jurisdiction over the employees of the above named agencies and who could issue direct and specific orders to county fruit inspectors concerning their duties in connection with the control program and could [illegible] In the past our connection with the field men of these cooperating agencies has been too impersonal and indirect. We have had to beg them to give ear to our supplications and whether they listened or whether they acted depended entirely on their vision, personal interest or sense of responsibility.

[illegible] efficiency of this help can be increased many fold by some such method as is indicated above. In fact this cooperation under proper control [illegible]

of local control to meet the demands of Blister Rust control in the state of Oregon for the future.

The accompanying tabulated report shows the counties of the state in which organized eradication work has been done and the results of the work to date.

Table No. VI.

Summary of Cultivated Black Currant Eradication, Oregon

County	1923		1924		1925	
	Plant.	Bushes	Plant.	Bushes	Plant.	Bushes
Baker					14	76
Benton	4	23	9	24		
Clackamas	152	5021	8	75		
Clatsop	243*	1475*				
Columbia	60	303				
Coos			20	120	1	6
Crook			1	7		
Curry			3	10		
Deschutes			9	43	14	82
Douglas			7	14		
**Gilham						
Grant					5	29
**Harney						
Hood River	16	59				
Jackson					43	138
**Jefferson						
Josephine			3	22	3	21
Klamath					22	138
Lake					4	15
Lane	5	18	16	65		
Lincoln			6	26		
Linn			15	68		
**Malheur						
Marion	21	1314	33	1069		
**Morrow						
Multnomah	515	7324	6	523	4	17
Polk	6	18	5	11		
**Sherman						
Tillamook	17	403			3	21
Umatilla					11	27
Union					60	199
Wallowa					9	38
***Wasco	2	26				
Washington	156	13634	1	53	1	23
**Wheeler						
Yamhill	31	643	4	21	1	2
TOTALS	1228	30261	196	2201	195	832

Grand Total Plantings 1619 Bushes 33,294

*Includes plantings and bushes removed voluntarily in 1922

**Enough scouting and survey work was done in these counties to ascertain that the cost of eradication work would be out of all proportion to the results obtained.

***Removed and reported by county agents.

VII.

Report on Reconnaissance in Northwestern Oregon
Season of 1925
by
A. Grasovsky, Agent

Purpose of Investigation. Prior to 1925, it was generally known, and was reported to the Western Branch of the Office of Blister Rust Control, that western white pine (*Pinus monticola* Don.) occurred in northwestern Oregon, particularly in Polk County. During the field season of 1925, the writer, assisted by Mr. K. McLeod, investigated this area for the Office of Blister Rust Control. The instructions issued by this Office were to determine (1) the area over which white pine occurred, (2) the amount of white pine present, (3) the condition of white pine reproduction and its rate of growth, and (4) the kinds and number of Ribes present.

The reason for this investigation was to determine the advisability of Ribes eradication in these white pine stands. Such eradication would be for one or both of two purposes (1) to delay the southward spread of white pine blister rust from the Puget Sound region of Washington toward the sugar pine stands of southern Oregon and California, and (2) to protect the white pine from damage by blister rust, if the white pine were present in sufficient amount to merit such protection.

Method of work. In order to secure comprehensive information on this entire area in the short time available two general methods of work were used. The first of these consisted of correlation of all information already available, such as the cruises of lumber companies owning the land. Preliminary information of great value was also secured from the office of the State Forester, Mr. F. A. Elliott. The second method consisted of actual field work. For this purpose, a section of land representing the best white pine in the region was covered by intensive reconnaissance according to instructions for such work as issued by the Western Branch of the Office of Blister Rust Control. On this section actual counts of Ribes and of white pine reproduction were made. The balance of the area was covered by a more rapid, extensive reconnaissance.

Results of Intensive Reconnaissance. In order to secure more accurate information on conditions in this region than was possible by extensive reconnaissance, an intensive reconnaissance study was made of Section 6, T 8 S., R 7 W, Willamette Meridian.

The above section was cruised in 1903 and found to have 5000 M. B. M. of white pine, 8" D. B. H. and over, but later cruises estimated the white pine to be 1080 M. B. M. Some of the best white pine of northwestern Oregon is in this section.

This section was selected with the view of determining the different "White pine - Ribes" types of this locality as three of the important types are found on it.

Table No. VII.
Ribes per acre in three white pine types,
Polk County, Oregon

Type	Ribes per acre			
	R. Sanguineum	R. lacustre	R. bracteosum	
Mature white pine	-	-	-	Based on 170 acres
Burn	100-1000	50-200	-	Based on 90 acres
Stream	-	10-50	2-10	Based on 110 acres

Results of Extensive Reconnaissance. The preliminary examination of existent records showed that 10 sections in Polk County were reported to contain a total of approximately 10,000 M. B. M. of white pine, and one isolated section in Tillamook County, 70 miles north of the Polk County stand was reported to contain scattering white pine trees.

The reconnaissance work, following the collection of these preliminary data, showed that there were scattered white pines throughout almost all of the county connecting the two stands of Polk and Tillamook Counties.

The white pine is found from T 2 N, R 6 W, to T 8 S, R 8 W (Willamette Meridian), a north and south stretch of 100 miles and over 10 miles wide at its widest point (T 6 S, R 7 W, R 8 W, R 9 W.) (Map 1.)

The Hebo burn in Tillamook and Yamhill counties which occurred about 70 years ago left but few traces of the original stand in the center of the white pine belt. A few white pine trees were found at great intervals on the trails through this burn. The forest north of the burn is a Douglas fir type in which scattered white pine was reported but not located. This forest causes possibly a 15-mile break in the 100-mile belt of white pine connecting the Polk and Tillamook County stands of white pine. In Tillamook County western white pine was located in approximately 12 sections.

The cruises of only 25 sections show western white pine while there are over 120 sections in which white pine was located.

Of the original white pine stand, in Northwestern Oregon only one section has been logged off. This section (T 8 S, R 8 W, Sec. 13) showed 100 M. B. M. of white pine, but according to a statement by the manager of the company owning this section "much more than that was

This section was selected with the view of determining the different "White pine - Fir" types of this locality as three of the important types are found on it.

Table No. VII.
Trees per acre in three white pine types,
Polk County, Oregon

Type	Trees per acre			
[illegible]	–	–	–	Based on 160 acres
[illegible]	[illegible]	[illegible]	–	[illegible]
[illegible]	[illegible]	[illegible]	–	[illegible]

Results of Extensive Reconnaissance. The preliminary examination of existent records showed that 10 sections in Polk County were reported to contain a total of approximately 10,000 M. B. M. of white pine, and one isolated section in Tillamook County, 70 miles north of the Polk County stand was reported to contain scattering white pine trees.

The reconnaissance work, following the collection of these [illegible] throughout almost all of the country connecting the two stands of Polk and Tillamook [illegible].

The white pine is found from T 8 S, R 6 W, to T 8 S, R 8 W [illegible] 10 miles wide at its widest point (T 6 S, R 7 W, R 8 W, R 9 W.) (Map 1.)

The Nebo burn in Tillamook and Yamhill counties which occurred about 70 years ago left but few traces of the original stand in the center of the white pine belt. A few white pine trees were found at great intervals on the trails through this burn. The forest north of the burn is a Douglas fir type in which scattered white pine was reported but not located. This forest causes possibly a 15-mile break in the 100-mile belt of white pine connecting the Polk and Tillamook County [illegible]

The cruises of only 25 sections show western white pine while there are over 120 sections in which white pine was located.

Of the original white pine stand, in Northwestern Oregon only one section has been logged off. This section (T 7 S, R 8 W, Sec. 19) showed 100 M. B. M. of white pine, but according to a statement by the manager of the company owning this section much more than that was

logged off". All of the white pine lumber was sold and shipped a short time after it reached the mill.

In one section only two white pine trees were reported by the cruisers, while over 500 trees are growing on the ridge of that section. For these reasons and others it may be safe to estimate the standing western white pine in northwestern Oregon to be 25,000 M.B.M. while the actual cruises show a little over 8000 M.B.M.

The commercial stands of white pine in northwestern Oregon are now confined to six townships:

T 6 S, R 8 W, R 9 W.
T 7 S, R 7 W R 8 W.
T 8 S, R 7 W, R 8 W

Most of the area in these townships are owned by:

1. Willamette Valley Logging Co.
2. Cobb-Mitchell Logging Co.
3. Mayami Co.
4. Weyerhaeuser Timber Co.
5. California and Oregon Land Co.

The accompanying map shows the location of the white pine stands, in northwestern Oregon, as determined by the reconnaissance of 1925.

The date collected in the intensive reconnaissance were used as a basis in the extensive reconnaissance, in which white pine stands were located in respect to section corners and compared as far as possible to one of the given types.

All areas of northwestern Oregon reported or expected to grow white pine were examined and in a few cases measurements were taken for comparison and growth study.

The composition of the white pine stands in northwestern Oregon vary greatly; in some instances white pine runs as high as 40% of the number of trees and in others diminishes to less than 1%. The heavier stands of white pine are found in association with hemlock. The number of white pine diminishes as the number of Douglas fir, Noble fir, and Cedar increases.

The successional development of the types can be traced from studies and observation made in plots of different age classes.

Three representative plots were selected in the white pine belt of Polk County, Oregon. The first plot was a clearing 200 feet by 300 feet which was logged and abandoned about 10 years ago. The trees

logged off". All of the white pine lumber was sold and shipped a short time after it reached the mill.

In one section only two white pine trees were reported by the cruisers, while over 800 trees are growing on the ridge of that section. For these reasons and others it may be safe to estimate the standing western white pine in northwestern Oregon to be 25,000 M.B.M., while the actual cruises show a little over 8000 M.B.M.

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[illegible]

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[illegible]

[illegible] The first plot was a clearing 200 feet by 300 feet which was logged and abandoned about 10 years ago. The type

surrounding the area are largely composed of hemlock, with a few Douglas fir (Pseudotsuga taxifolia), Noble fir (Abies noblis) and western red cedar. Two 150 feet high white pine trees are located on the north side of the clearing, one at the edge of the clearing, and the other about 100 feet from it.

Most of the seedlings in the plot are hemlock, growing 25 to 50 per square foot. There was one white pine to every 50 square feet and one of the three other timber species to every 25 square feet.

Table No. VIII.

Average Height Growth for 25 White Pine
Seedlings in Polk County, Oregon

	Average per Year				
Year	1917-21	1922	1923	1924	1925
Height in feet	0.2	0.3	0.4	0.8	1.1

The white pine were suppressed for the first five years after germination but have made an excellent growth in the last five years and have overtopped the rest of the seedlings.

The brush and reproduction covers the ground completely. The brush is mainly composed of: Rhododendron (Rhododendron albiflorum), Salmon-berry (Rubus spectabilis), Huckleberry (Vaccinum parvifolium), and Thimbleberry (Rubus parviflorus).

The second plot studied is about 50-75 years of age; one square chain was taken in the stand, the data of which are shown in the following table:

Table No. IX.

Tenth-acre Plot, White Pine Region,
Polk County, Oregon, 50 to 75 Years Old.

D. B. H. Inches	White pine	Hemlock	Cedar	Douglas & White Fir
4		3		1
6		1		1
8		2		1
10	1			
12	2			
14	4			1
16	4	1		
18	4	1		
20			1	1
22				
24	1		1	1
26				
28			2	
Total No. trees	16	8	4	6

Per Acre Basis

	White pine	Hemlock	Cedar	Fir	Total
No. of trees	160	80	40	60	340
% of trees	47.0	23.5	11.8	17.7	100
Basal area	221.8	43.2	138.8	70.2	476
% Basal area	47.0	9.1	29.2	14.7	100
Volume M. B. M.*	234.0	45.0	105.0	71.0	455
% of Vol. M.B.M.	51.5	9.9	23.0	15.6	100

*Trees below 10" D.B.H. not included.
*Volume taken from Volume tables on D.B.H. and number of 16-foot logs compiled by U.S.F.S. forthe Northwest.

While a great many hemlock trees were dead or dying in that plot only two dying and two dead white pine were found there. These pines close to white pines or Noble fir trees were probably suppressed by them.

The underbrush is mainly composed of Salal (Gaultheria shallon) Oregon grape (Berberis nervosa), Rhododendron (Rhododendron albiflorum), Huckleberry (Vaccinium parvifolium). The brush does not cover more than 5% of the ground. The decrease in density of underbrush is constant with

the increase of age (density of canopy) of the stand.

The Ribes are all shaded out of the stand.

The third plot studied is approximately 150-200 years of age, the data of which is shown in the following table:

Table No. X.

One-acre Plot, White Pine Region,
Polk County, Oregon,
150-200 Years of Age.

D.B.H.	White Pine	Hemlock	Fir*	Cedar	Total
4		2			
6		7			
8		15			
10	1	6			
12	1	11	1		
14	4	3	5	2	
16	6	2	2		
18	14	9	6	1	
20	5	7	1		
22	7		4		
24	10	2	6		
26	4	1	5		
28	7		4		
30	1		3		
32	4		1		
34	1				
36			1		
Total No. Trees	65	65	39	3	

No. trees	65	65	39	3	172
% of trees	37.8	37.8	22.7	1.7	100
Basal area (Sq.Ft.)	177.4	66.4	114.2	3.9	362.4
% Basal area	49.2	18.2	31.5	1.1	100
Volume M.B.M.**	44	11	21	--	76
% of Volume	58.0	14.5	27.0	0.5	100

*Douglas, Noble and Amabilis fir are included in this column.
**Trees below 10" D. B. H. are not included.
Volume taken from volume tables based on D. B.H. and number of 16-foot logs compiled by the U.S.F.S. for the Northwest.

No white pine trees were noticed dead or dying in this plot, while hemlock is shaded out rapidly. White pine snags are noticed usually for a longer period since they do not decay as fast as hemlock.

The underbrush in the above plot does not cover more than 1% of the ground and is mainly composed of Oregon grape (Berberis nervosa) and salal (Gaultheria shallon).

It appears from the study of the above three plots that even if we do not know how the stands may have started, the trend of their development is approximately the same.

The white pine, Douglas fir, and Noble fir trees due to the rapidity of growth maintain their own in the development of the forests of this locality, while the hemlock is shaded out (decreases in number) as the stand increases in age.

The trend of succession as indicated by those plots leads us to assume that white pine may be dominant when mature (climax of type) in some sections of northwestern Oregon. This is contrary to the belief that white pine is always a passing stage in the developmental succession in the northwestern forest. In northwest Oreaon the the white pine type is very localized and extends over a small area on the transition zone between the hemlock type and the Douglas fir forest (Polk County). White pine is a passing stage in succession in the true hemlock or true Douglas fir forest, but apparently there is some "no man's land" where white pine dominates and rules.

Three species of Ribes were located in this region: Ribes lacustre, R. sanguineum, and R. bracteosum. Of these species Ribes bracteosum is believed to be the most susceptible to white pine blister rust. It is found along streams and marshes, and is sometimes abundant on the lower elevation but diminishes in number on the higher elevation, close to white pine stands.

Ribes sanguineum is found mainly on burns (it is one of the first plants to take possession on burned areas), in open stands. Ribes lacustre is found along streams, on moist sites in dense timber, close to white pine trees.

Cost of Reconnaissance Work

120 sections growing white pine, approximately 120 sections without white pine (a total of 240 sections) were inspected during the field season.

Table No. XI.

Cost of Reconnaissance Private Lands
Oregon

Payroll	$477.00
Transportation and subsistence	518.74
Total	$995.74

Cost per section (including travel, reconnaissance, mapping, and writing report): $\frac{\$995.74}{240} = \$4.15$

Management Suggestions.

If it is desired to assure future white pine stands where white pine now dominates, it seems necessary to favor hemlock over Douglas fir and noble fir reproduction as Douglas fir and noble fir are fast growing trees and are serious competitors of white pine. While hemlock is not a serious hindrance to the growth of white pine in this region, and a heavy stand of it will tend to shade the Ribes early in the development of the stand.

A survey of logged and burned over areas should be made about three years after the burning to determine the composition of the reproduction. If white pine is not fully or evenly stocking the area, a planting crew should fill the gaps. (A section logged off in that region (T 8 S, R 8 W, Sec 13) was severely burned several times after logging. The scant vegetation growing there are: Fireweed (Epilobium spicatum); Thimbleberry (Rubus parviflorus); Bracken fern (Pteridium) and Ribes sanguineum. No reproduction has been noticed there yet.)

The planting crew should also eradicate the Ribes thus reducing the cost of the two operations. The number of remaining Ribes and those that may sprout after eradication will be negligible as most of the Ribes, it is expected, will be shaded out early in the development of the forest, and will not be a serious factor in the spread of white pine blister rust.

The only plantations in northwestern Oregon are to be found in the Nebo burn (Tillamook County). Eastern white pine (Pinus strobus) was planted here and it should be an index in demonstrating the possible success of Western white pine (Pinus monticola) plantations, for the growth of these planted pines is very similar to that of the natural reproduction of western white pine in this region, as seen from the following table:

Table No. XII.

Average Growth in Height
of 25 Seedlings.

	Year				
	1921	1922	1923	1924	1925
Planted E.W.P. Ft. Ht.	0.6	0.7	0.8	1.0	0.9
Natural reproduction W.W.P. Ft. Ht.		0.3	0.4	0.8	1.1

The greater rapidity of height growth for the planted pine, as shown in the above table (1922-1924) may be attributed to lack of competition with other species, as the Nebo area was burned over very severely and is now with little or no natural reproduction and a very light cover of brush.

Western white pine seedlings in this locality make approximately one foot in height in a normal year under normal conditions. (Table XII). Poles and Standards make two to three feet in height under favorable conditions. The average height growth per year for 10 trees in Tillamook County, 1915-1925 was 2.4 feet, and they increased in diameter with great rapidity.

Measurements lead us to believe that this rapidity of growth in height and diameter reaches the point of culmination at an age of 80-100 years - this will lead us to assume that under proper management the white pine stands could be operated on a 80-100 year rotation as the trees at this age are 150 feet in height and 22-26 inches in diameter, at breast height.

Summary

The Project: To determine by reconnaissance in Northwestern Oregon:

a. The commercial and botanical distribution of western white pine for that locality.

[illegible] plantations in northwestern [illegible] are to be [illegible] (Pinus [illegible]) [illegible] it should be an index in demonstrating the poss[illegible] success of western white pine (Pinus monticola) plantations, for the growth of these planted pines is very similar to that of the natural reproduction of western white pine in this region, as seen from the [illegible]

[illegible]

[illegible] competition with other species, [illegible] severely and is now with little or no natural reproduction and a very light cover of brush.

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[illegible] to believe that this rapidity of growth [illegible] the point of culmination at an age of [illegible] be operated on a [illegible] year rotation [illegible] feet in height and 22-28 inches in diameter, [illegible]

[illegible]: To determine by reconnaissance in Northwestern Oregon:

a. The commercial and botanical distribution of western white pine for that locality.

b. The approximate amount of merchantable standing western white pine in M. B. M.

c. The rate of growth, reproduction, and possible future stands of white pine.

d. The distribution and species of Ribes in the western white pine types.

e. The possibility and advisability of Ribes eradication to safeguard the present and future stands of western white pine.

f. The advisability of eradication of Ribes with the view of checking the spread of white pine blister rust to the south.

The Pine:

The data on hand before starting the field work was very limited.

Ten sections were reported to have approximately 10,000 M.B.M. of western white pine. These ten sections according to the latest cruises have 8000 M. B. M. (It appears that noble fir was included in the western white pine cruise).

The white pine in northwestern Oregon is found from T 3 N, R 6 W, to T 8 S, R 8 W, (Willamette Meridian), a north and south stretch of 100 miles and over 10 miles wide at its widest point (T 6 S, R 7 W, R 8 W, R 9 W.) (Map 1).

There are more than 120 sections in that locality in which western white pine grows. The latest cruises show approximately 8000 M. B. M. in them, but as not all the pine was cruised a great part of it was underestimated and it may be safe to estimate those stands at 25,000 M. B. M.

The composition of an area in one of the best stands of Western white pine is shown in the following table:

Table XIII.

Species	% of Stand	
	Trees	Basal Area
W. white pine	37.8	40.2
Hemlock	37.8	18.2
Fir (Noble, White)	13.4	20.0
Douglas fir	9.3	11.5
Cedar	1.7	1.1

The above table indicates that:

1. The white pine is the dominant species in the stand.

2. Western white pine is shading out the hemlock. (Number of trees equal but basal area greater).

3. Douglas fir and the true firs have a greater average basal area than the western white pine.

The natural reproduction in many clearings appear to make good growth (approximately 2 feet a year). In some cases, where in the area surrounding the clearing there are only 10-20 trees to the acre, in the clearing itself there are approximately 820 white pine seedlings to the acre, (one seedling to 50 sq. ft.).

Where most of the rest of the seedlings are hemlock the pine retains its own, shading out the hemlock as shown by Tables XIII and XIV.

Table No. XIV.

Species	No. Trees	Ave. D.B.H. in inches
Western white pine	80	16
Hemlock	40	6

Ribes:

R. bracteosum found mainly along streams and marshes. Sometimes abundant in the lower elevations diminishing in number closer to the pine area.

R. sanguineum found on burns and the open stands of the lower elevations.

R. lacustre found along streams and sometimes in the moist sites in the timber.

In the heavy and old stands of white pine there is but little underbrush and no Ribes at all. The Ribes are apparently shaded out when the pine is from 50 to 75 years of age.

Suggestions:

A. Planting crews when used to fill the gaps in poorly stocked areas should eradicate the Ribes during the same operation, by this the cost of either of the two operations is reduced.

B. Western white pine forests in northwestern Oregon should be managed on a rotation of 80-100 years. At this age white pine is approximately 150 feet high and 22 to 26 inches D. B. H. A well stocked forest at that age may have over 50 M. B. M. of white pine per acre.

C. The botanical distribution of western white pine in northwestern Oregon is spread over a large area. Therefore eradication of Ribes with the view of chekcing the spread of blister rust southward does not seem feasible.

D. Some sites have heavy stands of western white pine, others have good white pine reproduction. Therefore it seems that it may pay (economically) to eradicate the Ribes on these sites with the view of protecting the pine from blister rust.

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C. The botanical distribution of western white pine in northwestern Oregon is spread over a large area. Therefore eradication of Ribes with the view of checking the spread of blister rust southward does not seem feasible.

D. Some sites have heavy stands of western white pine, others have good white pine reproduction. Therefore it seems that it may pay (economically) to eradicate the Ribes on these sites with the view of protecting the pine from blister rust.

VIII.
Educational Work

a. Panel Exhibits.

The panel exhibits were used mostly in connection with the black currant eradication work. Spurlock and Drew had one exhibit in the northeastern part of Oregon and Mallery and Fehren had the other in southern Oregon. The plan was to place the exhibits in a conspicuous window or in the post office in the leading town of the county in which work was being carried on. While it is difficult to estimate the value of the panel the belief of Mr. Spurlock and Mr. Mallery is that they were well worth the trouble. The panel exhibits were also used at two of the county fairs in the fall.

b. Blister Rust Film.

The two reels of the Blister Rust film were used in connection with the black currant eradication chiefly. After Mallery had had them shown in the towns in Jackson, Josephine and Klamath Counties he sent them to Spurlock who had them run in the principal towns of northeastern Oregon, as far as he was able to schedule them in his limited time.

The Dalles High School made use of the film in January and turned it over to the motion picture house to be run there also.

On November 4 the film was used at Eugene in connection with a talk given to Professor Sweetzer's classes in Botany at the University of Oregon.

Mr. Burt who has charge of the motion picture end of the Extension Service of the Oregon Agricultural College has charge of the film at this writing and has listed it with the county agents for use about the state during the next few months.

c. Fair Exhibits.

Owing to the press of other work very little could be prepared for fair exhibits since the most of them came at about the same date. Interesting exhibits, however, were placed at the Clatsop County Fair at Astoria, the Tillamook County Fair at Tillamook, the Washington County Fair at Hillsboro and at the State Fair at Salem. The panels were used at Astoria and Tillamook and Photographs and specimens at Hillsboro and Salem. An abundance of cones and branches of Pinus Strobus and P. monticola and P. Lambertiana added to the interest of all these exhibits. Bulletin 1398 was used for distribution in all cases. The Oregon Nursery furnished two excellent pines for the exhibits at Hillsboro and Salem.

A carefully prepared exhibit was placed in one of the Reed College Buildings during the meeting of the American Association for the Advancement of Science, June 17 to 20 and the following meetings of Western Naturalists.

d. Posters and Bulletins.

The Blister Rust posters were sent to all the post offices in the state with the request that they be displayed. This request was very generally complied with as observations revealed.

The posters were also sent to some four hundred fire wardens with the request that they be conspicuously posted.

The eradication camp at Woodruff Meadows and trails in the vicinity of the Polk and Tillamook white pine areas were posted by our men.

The chief use for the bulletins was for distribution to the former black currant owners. Several hundred were also sent to county agents in response to requests from them. Fifty were given to Professor Sweetzer at the State University for use in his classes, his plan being to use them repeatedly. At the time posters were sent to the fire wardens bulletins were also sent. In all about 4000 bulletins have been distributed and 1500 posters.

e. Newspapers.

Of necessity there was a lull this year in leading articles in the large dailies of the state. In the sections where black currant eradication crews were working local papers told of the activities of the crews and gave information about Blister Rust. These write-ups were always the result of interviews and were for the most part reasonably accurate. Many of them went into the matter in some detail, two papers for instance published complete lists of our "Questions and Answers". Copies of the most of these news articles are on file in the Corvallis office.

f. Talks.

Talks on Blister Rust were made in several of the schools in northeastern Oregon in January, the State Fire Wardens' Convention was addressed on May 4 and Professor Sweetzer's class at the University of Oregon were addressed November 4, and the Normal School at Monmouth on November 30.

g. Form letters.

The following form letters were sent out during the course of the year, the first to all State Fire Wardens, and the second to all persons whose cultivated black currants had been eradicated.

STATE FORESTER, STATE HORTICULTURAL BOARD,
BOTANY DEPARTMENT, OREGON AGRICULTURAL COLLEGE AND
BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE,
COOPERATING

Blister-Rust Control

Botany Department, O.A.C.,
Corvallis, Oregon.
July 15, 1925.

We do not want you to forget that we have a Blister Rust Office at the College and that we are ready to answer questions.

Did you send us a specimen of that sickly gooseberry or currant you found the other day? Or was it a pine? We like to be bothered with these things. Send us specimens and we will tell you if you have Blister Rust. In case it is not Blister Rust and we do not know the trouble we will try to find out.

In case you wish to know what wild currants and gooseberries are growing in your section send us sprigs of the bushes with fruits if possible and we will tell you what you have.

If you find white or sugar pines or white-barked pines out of their usual range we will greatly appreciate knowing about them. We also wish to learn where these trees are growing in cultivation.

We are mailing you a copy of Farmers' Bulletin #1398. You will be interested in the marked portions. They give some pertinent facts about Blister Rust and the cultivated black currant.

One more thing, it is possible that some one of the Blister Rust crew may visit you this summer. In case this happens we will appreciate what assistance you can lend him either in the line of information or in getting to points where inspection may seem desirable.

Thanking you for past cooperation, I am

Yours very truly,

Leslie N. Goodding,
Assistant Pathologist.

lng/k
Encl.

STATE FORESTER, STATE HORTICULTURAL BOARD,
BOTANY DEPARTMENT, OREGON AGRICULTURAL COLLEGE AND
BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE,
COOPERATING

Blister-Rust Control

Botany Department, O.A.C.,
Corvallis, Oregon,
July 15, 1925.

Your name is on our lists as one who cooperated with the state and the nation in the fight to control the White Pine Blister Rust. From this fact we feel that you will be interested in enclosed Farmers' Bulletin #1398, recently published by the U. S. Department of Agriculture.

Beginning on page 18 of this bulletin you will find a discussion of Blister Rust. On the inside of the cover and on pages 20, 21, 22, 23 you will find special references to cultivated black currants. On page 35 you will find a statement of Oregon's Black Currant Law. And on pages 36, 37, 38 is given a digest of the quarantine regulations affecting the sale and distribution of currants, gooseberries and white pines.

If you are interested in raising currants or gooseberries you will be interested in the entire bulletin.

After reading this bulletin you may have questions arise in your mind about the Blister Rust situation in Oregon or about black currant eradication. If you will write to the Blister Rust Office, Oregon Agricultural College, Corvallis, Oregon we will try to answer your questions. If you have currants, gooseberries or white pines you fear are infected by this disease send in specimens and we will determine them for you.

Thanking you for past cooperation, I am

Yours very truly,

Leslie N. Goodding,
Assistant Pathologist.

lng/k
Encl.

IX.

Report on Scouting for Blister Rust
Oregon and Adjacent Washington, 1925

I. Inspection in connection with black currant eradication.

In all cases black currants were examined for Blister Rust at the time of location and eradication. This work extended into Douglas, Jackson and Josephine counties as well as all of the counties east of the Cascades and in the region in and about Portland. Black currants in other sections of the state were eradicated during previous years.

II. Nursery inspection.

Systematic inspection of Ribes and Pines in the nurseries was started the latter part of September and was made a part of the intensive inspection for Blister Rust.

III. Inspection of the coast and Columbia River region.

At the close of the black currant eradication work about September 20, two crews were organized to make a systematic and thorough search for Blister Rust along the coast and Columbia River west of the Cascades. As a result of finding Blister Rust two additional crews were put in the field September 25.

a. Goodding and Edmunds went to the coast in the Tillamook region and began inspection at Cloverdale near Pacific City. The Second inspection point was at Pacific City where Blister Rust was found on cultivated black currants September 22.

b. Mallery and Drew working down the Columbia from Portland on the Oregon side located the rust at Gnat Creek near Knappa on the wild black currant (Ribes bracteosum), September 24.

c. Goodding and Patty made a third location September 29 at Wheeler on the wild black currant. They continued the work north to Astoria.

d. Melis and Benedict scouted along the coast north and south from Newport as far as the roads would permit and later worked the Nehalem Valley from Jewel toward Astoria.

e. Hornibrook and Edmunds scouted along the north bank of the Columbia and located infection on wild black currants at Deep River near Naselle on October 2. The same day they made a second location at Naselle on the wild black currant and the coast trailing currant (Ribes laxiflorum).

IV. Inspection in Western Washington.

The inspection in western Washington bears a vital relation to Oregon. The intention was to confine the work to the region south and west of Olympia. A few inspections were made about Puyallup.

a. Hornibrook, Edmunds and Goodding inspected the black currants on the Litschke place about 10 miles north of Illwaco and found them heavily infected.

b. Goodding and Edmunds located infections 5 to 6 miles west of Olympia, west of McCleary, several places about Aberdeen and Hoquiam, near Porter, near Pell and southwest of South Bend. These locations together with those already made near Naselle and Illwaco confirmed us in the belief that the disease is well distributed throughout western Washington

V. Pine inspection.

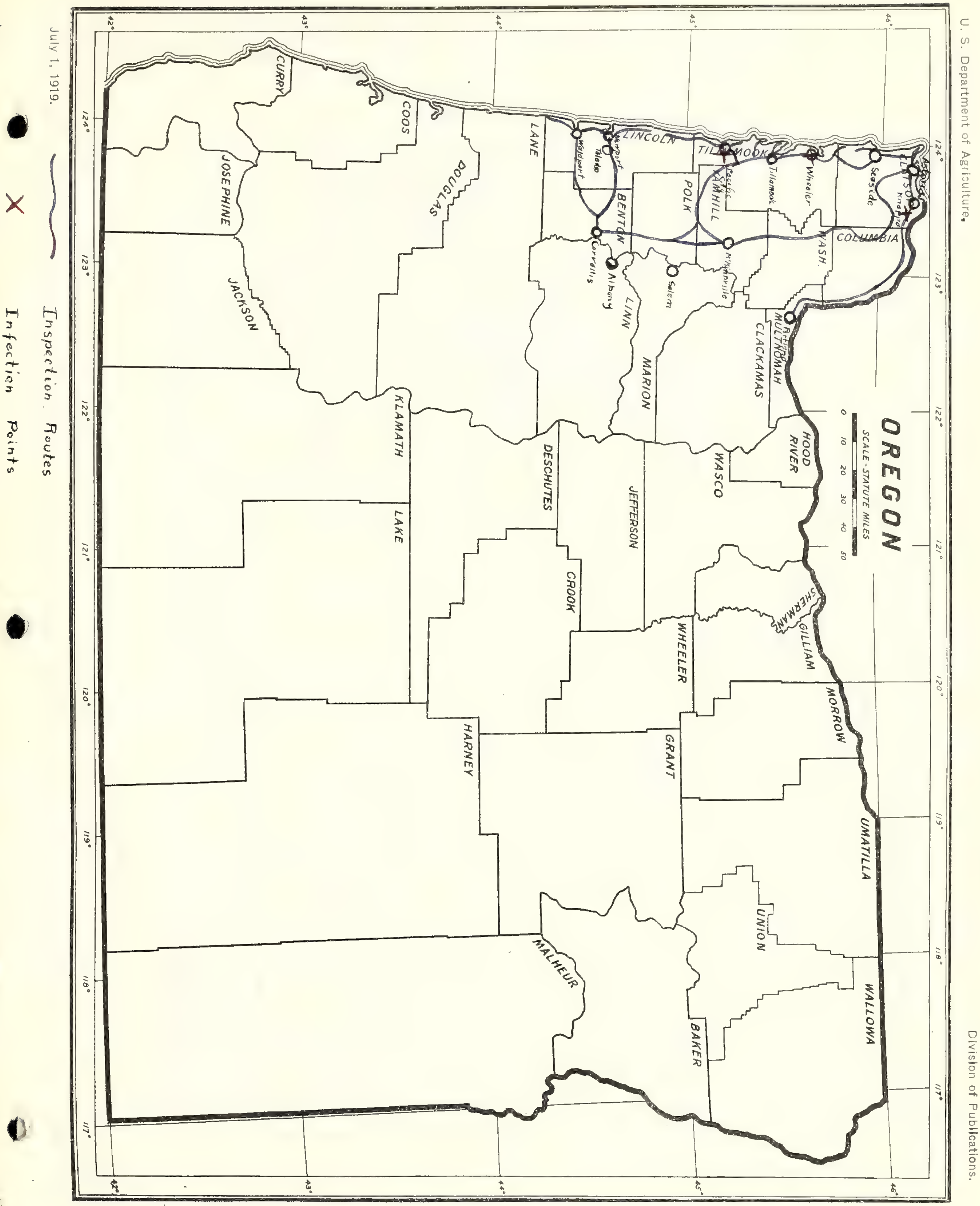
White pines on Mount Hebo, at Astoria and the Devil's Lake region west of Gales Creek and in the Polk County region near Black Rock showed no signs of Blister Rust and what is more significant Ribes in those regions showed no infection.

The only conclusion possible from the above findings is that the infections in Oregon are due to the long distance spread from the infected pines in Washington, probably some place east of Aberdeen.

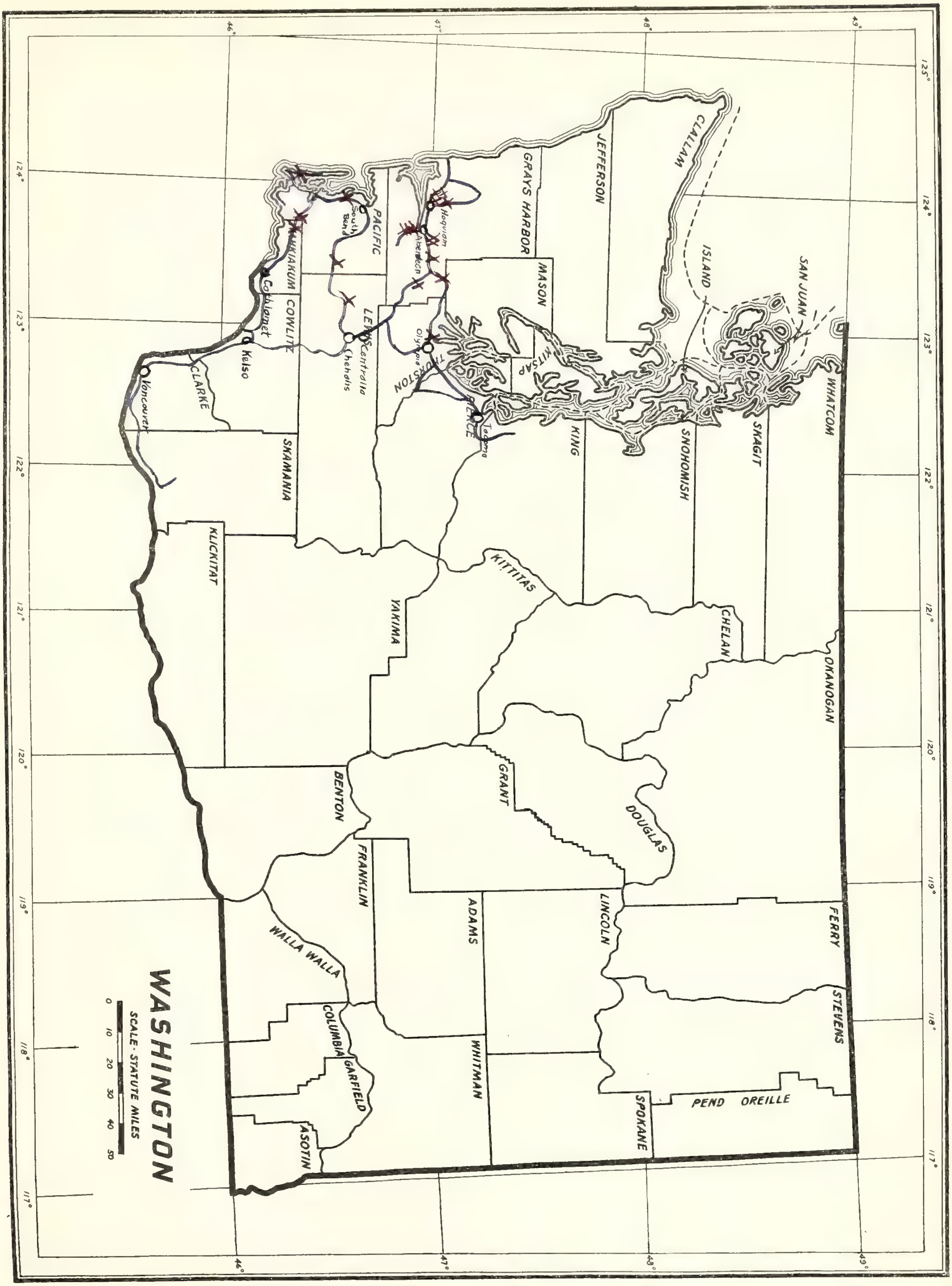
It is safe to conclude from the location of the infections in Oregon that the disease is much more widely spread than might be thought when considering that it was found in but three places. The summer was exceedingly dry permitting of very little intensification of the rust hence it could be found only after patient search and without doubt exists in many places not located.

It is safe to conclude also from the amount of inspection in and about Portland and down the coast below Pacific City that the range of the rust is confined to the northwest counties of the state of Oregon.

SEE MAPS.



Inspection Routes
Infection Points



Inspection Routes

Infection Points

X.
Nursery Inspection

Black currant eradication crews inspected all of the nurseries in the region where they did eradication work. As this work was done in the more arid sections where there are few nurseries the inspection had to be supplemented in the fall.

As nurseries to do interstate business are required to have certificates of inspection most of the nurseries are inspected by state men. We have undertaken to run inspection independent of the state, however. There seems to be the attitude on the part of the state men that our office should see to this phase of the work.

Of the 137 nurseries listed more than 100 do not handle currants or gooseberries. A few obtain their stock from the farmers, e.g. the Russelville Nursery handles large numbers of bushes that they obtain from all sorts of sources, the Portland Wholesale Nursery Company also seem to handle more stock than it grows.

By far the greater number of nurseries and also nurseries handling Ribes are in Multnomah County. Other counties handling appreciable numbers are Marion, Clackamas, Washington and Yamhill.

Estimates by the nurseries and from our inspection accredit to the state 265,374 currant bushes largely cuttings, 277,400 gooseberries mostly cuttings, 3,467 ornamental Ribes (R. sanguineum) and 244 White pines.

In spite of the apparently large numbers of Ribes in the nurseries commercial plantings are scarce and small plantings for homes are not as common as might be expected. Laziness, anthracnose and currant worms discourage the growing of Ribes generally.

The major part of the nursery inspection was done by Goodding and Edmunds.

Surmises are not made for publication but often they are helpful in establishing a policy. It is not improbable that Ribes have moved in truck loads between Washington and Oregon since the quarantine went into effect. We have no check on such movements.

X.

[illegible]

Black currant eradication crews inspected all of the nurseries in the region where they did eradication work. As this work was done in the more arid sections where there are few nurseries the inspection had to be supplemented in the fall.

As nurseries to do interstate business are required to carry certificates of inspection most of the nurseries are inspected by state men. We have undertaken to run inspection independent of the state, however. There seems to be the attitude on the part of the state that our office should see to this phase of the work.

Of the 187 nurseries listed more than 100 do not handle currants or gooseberries. A few obtain their stock from the farmers, e.g. the Russelville Nursery handles large numbers of bushes that they obtain from all sorts of sources, the Portland Wholesale Nursery Company also seem to handle more stock than it grows.

By far the greater number of nurseries and also nurseries handling Ribes are in Multnomah County. Other counties handling appreciable numbers are Marion, Clackamas, Washington and Yamhill.

Estimates by the nurseries and from our inspection accredit to the state 235,171 currant bushes [illegible], cuttings, [illegible] mostly cuttings, 3,467 ornamental Ribes (R. sanguineum) and 244 White pines.

In spite of the apparently large numbers of Ribes in the nurseries commercial plantings are scarce and small plantings for homes are not as common as might be expected. Laziness, anthracnose and currant worms discourage the growing of Ribes generally.

The major part of the nursery inspection was done by Redding and Edmunds.

Surmises are not made for publication but often they are helpful in establishing a policy. It is not improbable that Ribes have moved in truck loads between Washington and Oregon since the quarantine went into effect. We have no check on such movements.

Table No. XV.
Number of Ribes and White Pines in Nurseries in 1925
Based on Estimates by the Nurseries and on Inspection Records.

Name and Address	Red & White Currants	Goose-berries	Orna-mental	Black Currants	White Pine
Anderson Nursery, Portland, Ore., R.F.D.#1	1,000	500			
Benedict Nursery 185 E. 87th St., Portland, Ore.	25,000	10,000	500		
Butzer's Nursery (Gets stock from Portland, Ore. farmer)	2,000	4,000			
Brook's Nursery Lafayette, Ore.		6,000			
Carlton Nursery Carlton, Ore.	300	5,000			
Cherry Park Nursery Co. Troutdale, Ore.	4,000				
Columbia Nursery Portland, Ore.	1,000	2,500			
Eden Valley Nursery Medford, Ore.	700	200			
Forshaw Nursery Pendleton, Ore.	100	few	2		
Erickson, Ole Astoria, Ore.	few	few			4
Houseweart Nursery Woodburn, Ore.	50,000				
Hudson Nursery Tangent, Ore.	2,000	2,000			
Hyland Nursery 2123 N. Broadway, Salem, Ore.		200	15		
Lafayette Nursery Company Lafayette, Ore.	2,000	10,000			
Lewis & Simpson Troutdale, Ore.	35,000	60,000			
Mathis Nursery Salem, Oregon	500				
Milton Nursery Milton, Oregon	5,000				
Odell, R. N. 1360 Alemada St., Portland Ore.	few	few			
Oregon Nursery Co. Orenco, Ore.	10,300	13,000	100		85
Pearcy Brothers Salem, Ore.			200		
Quaker Nursery Co. (C.F. Lansing) Salem, Ore.	500	500			

Table No. XV. (Continued)

Name and Address	Red & White Currants	Goose-berries	Ornamental	Black Currants	White Pine
Pilkington, J. B. Box 242, Portland, Ore.	1,000		300		104
Porters, R. B. Forest Grove, Ore.		500			
Portland Rose Nursery 1882 Division St. Portland, Ore.			250		50
Portland Wholesale Nursery Co. 971 Sandy Blvd, Portland, Ore.	100,000	100,000	2,000		
Redfeather Landscape Nursery Clackamas, Oregon	250				
Rose Valley Nursery 752 Corbet St., Portland, Ore.			50		
Russelville Nursery Co. Portland, Ore.	10,000	10,000			
Robbins (Gilbert) Nursery R. 5, Oregon City, Ore.	200		few		
Schools Nursery Hillsboro, Ore. Route 2		500			
North Silverton Nursery Silverton, Ore.	few	few			
Ti-a-wha Route 1, Clackamas, Oregon					2
Villa Nurseries Portland, Ore.	10,000	45,000			
Weygandt (F.A.) & Son Canby, Ore.	4,000	2,000			
Willow Glenn Nursery La Grande, Oregon	24				
Woodruff Nursery Eugene, Oregon	500	500	50		
TOTALS	265,374	277,400	3,467		245

XI.

Report on Wind River Nursery

The conditions at the Forest Service Wind River Nursery, Washington, are given in the following letters:

Botany Dept., O.A.C.
Corvallis, Oregon,
November 2, 1925

Mr. S. N. Wyckoff
618 Realty Building,
Spokane, Washington

Dear Wyckoff:

I visited the Wind River Nursery and found very little there to inspect. They have some white pines in the arboretum and a very few in the nursery. The species are P. monticola, P. lambertiana, P. flexilis and P. albicaulis. They do not have any of the last in the nursery. All of them in the seed beds are being grown for Dr. Boyce. R. bracteosum was found along the streams on two sides. Other Ribes are very scarce. There is some R. sanguineum but we did not observe it in our meagre inspection.

I inquired into the attitude of the Forest Service toward raising white pines. Granger was not at all averse to using white pine in the reforestation program providing there was a reasonable assurance of protection from Blister Rust. Munger was even more appreciative of white pine as a possibility but also more fearful of the results of the Blister Rust. Kummel, who has charge of forest planting was also fearful of the results of Blister Rust. He also thought it likely that white pine being out of its maximum range in Oregon and the Cascades of Washington would fail to justify extensive planting. He, however, was of the opinion it might be feasible to use it in mixed stands with Douglas fir and other species if we could be assured adequate protection.

I learned at the nursery that they stopped growing white pine not because of the fear of rust so much as because of the restrictions placed on the shipments of pines from the nursery by the state of Washington. As none of the pines could be used outside of the county the entire stock of about 40,000 young trees was destroyed. Prior to the Blister Rust scare they were being used in several areas in the Cascades in mixture with Douglas firs. Mr. Kummel and Mr. Wills, the nurseryman, express the hope that they may be enabled to grow white pines once more as they are easy to handle and give excellent results in transplanting.

I believe that the results of our investigation in western Oregon and those we expect to make in the Cascades next season may well be expected to stimulate an interest in planting white pine in the national forests of Washington and Oregon. Somethings, however, will be strictly up to us:

First, we must remove from the minds of the Forest Service and the public the unreasonable bogie that our white pines in the Cascades and the coast range are doomed. Our advice should be "plant white pines and protect them," not "Be careful! Be careful! or you will spread Blister Rust".

Second, we must insure adequate protection for pines in some government nursery. The logical place for this is Wind River since the nursery and experiment station are already there.

Third, the unreasonable restrictions on shipping must be removed. I think that we are in a large measure responsible for these restrictions, ourselves.

Fourth, a cooperative policy should be inaugurated with the Forest Service whereby lands will be chosen for white pine planting which are either Ribes free or which lend themselves to control at small cost.

Fifth, we must know more about _R. bracteosum_ in relation to Blister Rust. We have just reason to fear it. Eight or nine hundred foot limits when this species is considered may be a terrible stumbling stone. Also experimental eradication should be undertaken so that we may know what we are up against.

Sixth, it will probably be advisable to have a Blister Rust man on the nursery grounds during the entire field season. He could well make white pine studies along with his other work.

The accompanying map of the Wind River section shows the two streams mentioned as having _R. bracteosum_. It is not so abundant in this region as it is in many places but is liberally scattered along the streams. Adequate protection will mean clearing it out for at least two miles in any direction from the nursery. A redeeming feature here is that there is abundant young growth of white pines throughout this region which may well be protected.

I hope that some definite plans and recommendations can be made to the Forest Service next season. Who pays the bills for the eradication work if it is decided upon may very well be secondary.

If this does not contain matters out of keeping with your program please send a copy to Detwiler.

Yours very truly,

(Signed) L. N. Goodding.

618 Realty Bldg.,
Spokane, Wash.
Nov. 7, 1925

Mr. L. N. Goodding,
Botany Dept., O. A. C.
Corvallis, Ore.

Dear Goodding:

I have your letter of November 2, which seems to contain a large number of good ideas. You are now thinking along the line which will be of greatest value to you and to us in the development of our program in western Oregon. Before discussing this letter I should like to point out one matter which has just occurred to me. It seems to me that it would be a mistake to separate western Washington from western Oregon in any plan for the development of our work in these regions. The logical division should be between the Inland Empire white pine belt and the coast region of Oregon and Washington taken together, rather than a purely artificial division between western Oregon and western Washington. You are, I believe, now working along the right line to develop our work in this general region. This entire region lies in the same Forest Service district. The Wind River Nursery, which will doubtless be a factor in your plans, is situated in Washington. For these several reasons I am thinking over the matter of assigning to you the development of all our work in western Washington and western Oregon, this region to be taken as a unit. Will you please think this over and write me your ideas on it.

Discussing the several points mentioned in the two pages of your letter, the first one is, I believe, self evident. We shall never get very far in our work if we adopt a hold-back attitude. It is certainly our business to advocate not only the protection of white pine but the growing of white pine.

Your second and third points must be taken up together. I can foresee the possibility that arrangements might be made whereby white pine stock was raised at the Wind River Nursery, this area very carefully protected from infection by blister rust, and arrangements then made with the Federal Horticultural Board, the several state officials involved, and the Forest Service to permit the shipment of this pine stock to any point in western Oregon or western Washington for its use as planting stock on national forests. Should such a scheme be put into effect it will undoubtedly be up to us to at least supervise and instruct the protection work if not to actually do it. That, however, is part of our job. I have not, of course, taken up this matter with Mr. Detwiler but I feel reasonably sure that he will see this as we do. This is a matter which we might present to the District Forester at Portland after receiving Mr. Detwiler's approval of the scheme.

Your fourth point is an excellent one. Such work would be in the nature of a new form of reconnaissance to be done by this Office. The first step would of course be to ascertain from the Forest Service the types of forest land in western Washington and Oregon which they consider best suited for white pine. We could then investigate such lands and get some information in regard to the Ribes on them.

I must confess that I do not feel so anxious about _Ribes bracteosum_ as you do. It will doubtless be the largest factor in pine infection on the coast region but I do not believe it will be anything like _Ribes nigrum_. This is a problem which we can very probably turn over to Lachmund for solution.

I do not exactly get your point in regard to having a blister rust man situated at the Wind River Nursery during the entire field season. Should Ribes eradication work be undertaken there some of our men will be on the ground. We should at other times make inspections at the nursery and we should have to check the eradication work very carefully to be sure that no Ribes were left on the ground and that new seedlings or sprouts were removed as soon as they appeared.

This entire scheme appears to me sufficiently feasible so that I should like to have you write it up in the form of a definite working plan, stating exactly what we should do and the people with whom we should have to work. We can then go over this during my next visit to Oregon.

I am sending a copy of this letter and also yours to Mr. Detwiler.

Sincerely yours,

(Signed) Stephen N. Wyckoff
Pathologist

Botany Dept., O.A.C.,
Corvallis, Oregon,
November 13, 1925

Mr. S. N. Wyckoff
618 Realty Building,
Spokane, Wash.

Dear Wyckoff:

Several phases of the working plan for western Washington and Oregon are not well formulated in my mind and I shall need to talk with you before definitely figuring on them.

I am from Missouri about R. bracteosum. I am perfectly willing to have Lachmund show me. Work done in protecting the Wind River Nursery will give us some experience in handling it.

I have a feeling that the ability of Ribes to produce sporidia which will infect pines at different distances will eventually be ascribed to some factor entirely apart from quantity production of sporidia although the distance infection carries may be in direct proportion to such production and to susceptibility.

The Plan for Western Washington.

1. It will be necessary to clean up the cultivated black currants. This would mean working for some active state cooperation. The attitude of the state officials has resulted in the opposition, what little there is, on the part of the people generally. A remark of the owner of about three hundred bushes at Puyallup is characteristic. "I do not care for these bushes particularly. I asked John Doe, state official, if I should take them out and he said, 'Certainly not until they show infection.' If they are a menace to timber I am willing to take them out at any time if the state officials instruct me to do so."

If the state people could be induced to eradicate as soon as infection appears it would help materially.

II. Some clear cut information on white pine in Washington would help in securing state cooperation. Munger told me of visiting some cut-over land on the Olympic Peninsula. The owner of the tract pointed out with considerable pride the abundant white pine reproduction. Many others probably feel much the same. I fancy conditions in Washington and Oregon are comparable and that some white pine investigations similar to that made by Grasovsky would be very helpful.

The reconnaissance in the Cascades could well be extended to the state of Washington. This would give us material to use with the Forest Service as well as with the state people. Such reconnaissance could well serve two purposes, viz., the determination of the present stand and general investigation on regions suitable for growing pines. This work

would not need to be completed in one season but could well be made a continuous program.

III. Educational work could well be undertaken. Just what kind and how much I do not know. I favor something permanent in the schools, such as our talked of bulletin on Blister Rust for the higher grades.

1. The Fore st School of the University and the State forest organizations should be circularized and individuals interviewed.

2. As indicated in No. 1, an effort should be made to get adequate cooperation of the State Board of Horticulture.

3. The personnel of District 6 should be kept in close touch with the work.

4. Some careful inspection should be undertaken in the spring to locate pine infections. I think our knowledge of Ribes infection points will simplify this. Work of this sort would give us a basis for an approach to black currant owners.

5. I can see a possible use for the Ribes substitutes in our western Washington work. We should get to the bottom of things, however, before we start a program of doling out substitutes.

6. <u>Protection of the Wind River Nursery.</u>

   a. A little reconnaissance may be necessary to determine the exact situation.

   b. Careful eradication should take place on an extra wide belt about the nursery.

   c. Thorough inspection of the nursery and surroundings each year at regular intervals should warrant proper certification of seedlings for planting.

7. Proper arrangements should be made to supply through timber associations, the Extension Service or other responsible organizations seedlings to private land owners under restrictions requiring adequate protection against Blister Rust.

8. To insure adequate protection of the Wind River Nursery a Blister Rust man might be established in the nursery and paid by the Experiment Station, Forest Service and Blister Rust Office. This is a mere suggestion and may not be feasible.

I wish to talk over with you such points as the mutual arrangements with the Forest Service and Reconnaissance to get information on white pine stands and land suitable for re-forestation. In fact, all the points I have mentioned need to be thrashed.

I assume that such a program would extend over several years and would not require the out-lay of men and money that the items of the plan might seem to indicate.

Very truly yours,

(Signed) L. N. Goodding,
Assistant Pathologist.

XI.

Recommendations

Ribes eradication on National Forest

In case eradication work is done in Oregon in the Sugar Pine region the coming season it should be in a locality where reproduction is abundant, preferably in a cut-over or burned over area. Much has been said about the inferiority of the coast Sugar pine. In such region, however, this opinion of inferiority of the Sugar pine does not seem to hold. Walsh, fire warden for Coos County, reports some excellent stands in eastern Coos and Curry Counties. It may be well to investigate some of these areas.

As state lines are political and hence important it might be best to comform to the ten-year program and to do eradication work in an area in California.

Black Currant Eradication.

The State Board of Horticulture should assume entire responsibility for black currant eradication. Some system will need to be devised to ensure the continuance of this work. The people of the state must not forget that black currants are a nuisance and the State Board of Horticulture must not forget to enforce the black currant law. If possible the State Board of Horticulture should finance a man whose duty will be strictly Blister Rust. This seems to be impossible before the next session of the Legislature.

A state appropriation for Blister Rust work could well be devoted to something of this nature rather than to an eradication problem in a White pine stand.

Reconnaissance.

General reconnaissance of the Cascades should be undertaken. This can well be extended into Washington. It might be well also to carry on further reconnaissance in Sugar pine belts of southern Oregon.

Educational.

A school bulletin would prove helpful. This should be used in the 6th, 7th and 8th grades and in the high school as an integral part of courses in science and agriculture.

An up-to-date write-up of Blister Rust to be used for supplying information to those asking for such should be gotten up. The former set of "Questions and Answers" proved popular.

Fair Exhibits.

County fairs offer an excellent opportunity to get educational matter before the public. An attempt should be made to reach about six fairs each year. More fairs cannot be attended, because of lack of material and lack of men to attend the exhibit. Exhibits alone are not so effective as exhibits with a man in attendance to answer questions and make explanations.

The stress in the future should be laid on White pine rather than on Blister Rust and the disease should be treated incidentally.

Nursery Inspection.

This phase of the work should be started earlier the coming year than it was this year and be done more systematically. The ideal system would be to work with the State Board of Horticulture and make inspections at the same time their inspections for certification is taking place.

Quarantine Inspection.

Definite plans should be laid with the State Board of Horticulture at an early date to have quarantine regulations enforced on the interstate bridges and ferries. The state has sufficient at stake that it can be interested in quarantine enforcement. Plans should be formulated to properly post the approaches to the bridges and ferries with signs which can be easily read from moving cars.

Wind River Nursery.

This is mentioned because of its possible relation to reforestation in Oregon. See report and recommendations elsewhere.

Inspection for Blister Rust in Oregon.

Much the same territory should be scouted as was covered this season. Special care should be taken to examine the R. bracteosum near the White pine at the reservoir at Astoria and the bushes of the same species near the pines on the old Erickson Nursery west of Astoria. More work should be done on the high exposed points such as Saddle Mountain in Clatsop County.

BLISTER RUST CONTROL WORK IN CALIFORNIA, 1925

Blister rust control work in California during 1925 was directed by Mr. G. A. Root, Assistant Pathologist and State Leader, and under the terms of the cooperative agreement given below Mr. Root is headquartered at Sacramento, California, occupying office space in the State Department of Agriculture. Mr. Root's report gives the results of the work in California.

MEMORANDUM OF UNDERSTANDING BETWEEN THE CALIFORNIA DEPARTMENT OF AGRICULTURE, THE CALIFORNIA STATE BOARD OF FORESTRY, AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF THE WHITE PINE BLISTER RUST IN CALIFORNIA.

EFFECTIVE JULY 1, 1925, to JUNE 30, 1926.

The object of this memorandum of understanding shall be to facilitate the prompt location and eradication and effective control of white pine blister rust in California, in view of the threatened destruction of timber throughout the West as a result of the presence of this disease in the West, and the danger of its further spread by natural dissemination or quarantine violation.

It is agreed that the California Department of Agriculture and the California State Board of Forestry, parties of the first part, and the Bureau of Plant Industry, United States Department of Agriculture, party of the second part, shall cooperate to the above ends in accordance with the following plan:

1. The California Department of Agriculture and the Bureau of Plant Industry shall cooperate with the Federal Horticultural Board in the strict enforcement of State and Federal blister rust quarantines now in effect or which may be promulgated. The California Department of Agriculture and the Bureau of Plant Industry shall each pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violations of these blister rust quarantines.

2. The Bureau of Plant Industry shall, for the field season of 1925, pay the salaries and expenses of one or more men, who shall do the necessary scouting for the disease and the locating of cultivated black currants in California.

3. The California Department of Agriculture shall use its regular employees so far as their other duties permit, and shall direct the work of its cooperating horticultural officials, so far as their other duties permit, in systematically locating cultivated black currants and infected blister rust host plants; in scouting for the blister rust;

BLISTER RUST CONTROL WORK IN CALIFORNIA,

1925

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in inspecting nurseries for this disease and in enforcing State and Federal blister rust quarantines. It is recognized that the California Department of Agriculture has no special appropriation for blister rust control, and that therefore such blister rust control work as is performed by the employees of the California Department of Agriculture and its cooperating horticultural officials will be done in connection with their other duties. Such work will aggregate approximately 1200 man-days, representing a total expenditure of approximately $6000.00 for the control of this disease during the period covered by this agreement. The expenditures of the Bureau of Plant Industry, as indicated in the previous paragraphs, will aggregate approximately $6000.00, during the period covered by this agreement, but none of the Federal funds shall be spent in compensation for plants destroyed in control work.

4. The California State Board of Forestry shall use its regular employees, so far as their other duties permit, in systematically locating cultivated black currants and in scouting for the blister rust on its wild and cultivated host plants. Such work will aggregate a total expenditure by the California State Board of Forestry of approximately $2500.00 for the control of this disease during the period covered by this agreement.

5. All official records of the work performed under this agreement shall be open to inspection by any or all parties to this agreement. All findings of the blister rust made by any party to this agreement shall be promptly reported to all other parties to this agreement. All specimens collected by any party to this agreement, which are suspected to be infected with blister rust, shall be submitted to the Bureau of Plant Industry for final determination. The Bureau of Plant Industry shall give such technical information to the employees of the parties to this agreement as will enable them to recognize the several stages of the disease.

6. It is understood that the Bureau of Plant Undustry shall be primarily responsible for scouting and locating the blister rust in California, and for furnishing technical information on its control, but that the Federal Government has no authority to destroy private or State property and therefore that the California Department of Agriculture shall be wholly responsible for destroying such pines, currant and gooseberry plants as may be found necessary in order to control the spread of this disease in California, including plants shipped in violation of State and Federal blister rust quarantines.

7. This memorandum of understanding shall take effect July 1, 1925, and continue in force until June 30, 1926, or until previously terminated by mutual consent of the parties to this agreement.

in inspecting nurseries for this disease and in enforcing State and Fed-eral blister rust quarantines. It is recognized that the California De-partment of Agriculture has no special appropriation for blister rust con-trol, and that therefore such blister rust control work as is performed by the employees of the California Department of Agriculture and its co-operating horticultural officials will be done in connection with their other duties. Such work will aggregate approximately 1200 man-days, rep-resenting a total expenditure of approximately $[illegible] for the control of this disease during the period covered by this agreement. The expendi-tures of the Bureau of Plant Industry, as indicated in the previous para-graphs, will aggregate approximately $[illegible], during the period covered by this agreement, but none of the Federal funds shall be used as com-pensation for plants destroyed in control work.

4. The California State Board of Forestry shall use its reg-ular employees, so far as their other duties permit, in systematically locating cultivated black currants and in scouting for the blister rust on its wild and cultivated host plants. Such work will aggregate a total expenditure by the California State Board of Forestry of approximately $[illegible] for the control of this disease during the period covered by the agreement.

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6. It is understood that the Bureau of Plant Industry shall be primarily responsible for scouting and locating the blister rust in Califor-nia, and for furnishing technical information on its control, but that the Federal Government has no authority to destroy private or State prop-erty and therefore that the California Department of Agriculture shall be wholly responsible for destroying such plants, currants and gooseberries as may be found necessary in order to control the spread of this disease in California, including plants shipped in violation of State and Federal blister rust quarantines.

7. This memorandum of understanding shall take effect July 1, [illegible], and continue in force until June 30, [illegible], or until previously ter-minated by mutual consent of the parties to this agreement.

Signatures

August 1	(s.) G. H. Hecke
Date	Director, California Department of Agriculture.
July 27	(s.) M. B. Pratt
Date	State Forester
Aug. 14, 1925	(s.) K. F. Kellerman
	Chief, Bureau of Plant Industry, United States Department of Agriculture

White Pine Blister Rust Control
California - 1925

George A. Root, Assistant Pathologist.

The Blister Rust work in this state was a continuation of that carried on in 1924. A new cooperative agreement, essentially the same as that of last year, was approved by the U. S. Bureau of Plant Industry, the State Department of Agriculture, and the State Board of Forestry.

Black Currant Eradication:
The major part of the work in 1925 consisted of the eradication of the cultivated English black currant (R. nigrum). An average of three men and two autos were in the field from June 1 to November 1. Up to and prior to June 1, one man was employed from the first of the year. After November 1, one man was retained until December 31. After a study of two season's work, it seems best to put all the men and funds into a single field season and not carry this work over the entire year.

The usual method of eradication was followed. The consent of the owner of the bushes is still necessary, owing to the failure of the Black Currant bill to become a law. This bill, making it a misdemeanor to grow, sell or propagate these bushes, was introduced and passed bythe State legislature early in 1925. It was pocket vetoed by the State executive, notwithstanding the apparent absence of any protests. The failure of the bill has made it more difficult to get consent of the owners. They are aware of this and "hold out" until such a law is enacted. Fortunately, the greater number of these "hold-outs" are not in the sugar pine regions.

It will not be amiss to tabulate the results of the work of 1924 so that a comparison of some interest may be made.

Table No. I.
Cultivated Black Currant Eradication - California
1924

County	Eradicated		Not Eradicated		Total	
	Plantings	Plants	Plantings	Plants	Plantings	Plants
Del Norte	4	13	--	--	4	13
Humboldt	235	1569	7	46	242	1615
Lassen	9	45	--	--	9	45
Modoc	5	16	--	--	5	16
Shasta	6	14	--	--	6	14
Siskiyou	5	38	--	--	5	38
Trinity	2	8	--	--	2	8
Total	266	1703	7	46	273	1749

The following is a result of the season's work from January 1 to December 31, 1925:

Table No. II.
Cultivated Black Currant Eradication - California
1925

County	Eradicated				Total	
	Plantings	Plants	Plantings	Plants	Plantings	Plants
Butte	17	34	1	1	18	35
Colusa (W. half)	--	--	--	--	--	--
Del Norte	2	2	1	6	3	8
Glenn	--	--	--	--	--	--
Humboldt	9	33	--	--	9	33
Lake	7	13	--	--	7	13
Mendocino	6	27	--	--	6	27
Nevada	83	454	1	3	84	457
Placer	21	67	1	12	22	79
Plumas	23	209	1	5	24	214
Sierra	17	84	--	--	17	84
Sonoma	47	503	3	8	50	511
Tehama	2	3	--	--	2	3
Total	234	1429	8	35	242	1464

The following is the number of bushes found during 1924 and 1925.

Table No. III.
Cultivated Black Currant Eradication - California
1924-1925

County	Eradicated		Not Eradicated		Total	
	Plantings	plants	Plantings	Plants	Plantings	Plants
Butte	17	34	1	1	18	35
Colusa (W.half	--	--	--	--	--	--
Del Norte	6	15	1	6	7	21
Glenn	--	--	--	--	--	--
Humboldt	244	1602	7	46	251	1648
Lake	7	13	--	--	7	13
Lassen	9	45	--	--	9	45
Mendocino	6	27	--	--	6	27
Modoc	5	16	--	--	5	16
Nevada	83	454	1	3	84	457
Placer	21	67	1	12	22	79
Plumas	23	209	1	5	24	214
Shasta	6	14	--	--	6	14
Sierra	17	84	--	--	17	84
Siskyou	5	38	--	--	5	38
Sonoma	47	503	3	8	50	511
Tehama	2	3	--	--	2	3
Trinity	2	8	--	--	2	8
Total	500	3132	* 15	*81	515	3213

*Still pending - further efforts being made to secure their removal.

Of the 15 plantings listed as "hold outs", two of this number represent the plantings awaiting work from owners, and the owner of another says he will remove this winter. This leaves 12 strictly opposed to the removal of the bushes. Some may eventually be taken out by action of the Horticultural Commissioners and by further efforts of our men.

Nursery Inspection

A circular letter sent to all the nurseries in 1924 regarding the possible possession of black currants, resulted in a goodly number of replies. To those who did not respond, a second letter was sent this year. A considerable number answered this letter. About 80% of the 1523 nurseries answered either letter. Personal visits by members of this office or the County Horticultural Commissioners are being made to those nurseries that did not respond. It is believed that all black currants have been removed from the California nurseries. Twenty-four reported the removal of 4569 bushes. A very favorable attitude has been taken by nurserymen regarding the destruction and non-sale of these bushes.

The following is the number of bushes found during 1924 and 1925.

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Del Norte	6	15	1	6	7	21
Glenn	--	--	--	--	--	--
Humboldt	244	1602	7	43	251	1645
Lake	7	12	--	--	7	12
Lassen	9	45	--	--	9	45
Mendocino	6	37	--	--	6	37
Modoc	6	15	--	--	6	15
[illegible]	56	454	1	3	57	457
Placer	21	67	1	12	22	79
Plumas	25	209	1	5	26	214
Shasta	6	14	--	--	6	14
Sierra	17	54	--	--	17	54
Siskiyou	5	33	--	--	5	33
Sonoma	47	500	3	11	50	511
Tehama	2	3	--	--	2	3
Trinity	2	3	--	--	2	3
Total	500	3152	* 15	*61	515	3213

*Still pending - further efforts being made to secure their removal.

Of the 15 plantings listed as "hold outs", two of this number represent the plantings awaiting word from owners, and the owner of another says he will remove this winter. This leaves 12 strictly opposed to the removal of the bushes. Some may eventually be taken out by action of the Horticultural Commissioners and by further efforts of our men.

Nursery Inspection

A circular letter sent to all the nurseries in 1924 regarding the possible possession of black currants, resulted in a small number of replies. To those who did not respond, a second letter was sent this year. A considerable number answered this letter. About 80% of the 1585 nurseries answered either letter. Personal visits by members of this office or the County Horticultural Commissioners are being made to those nurseries that did not respond. It is believed that all black currants have been removed from the California nurseries. Twenty-four reported the removal of 4569 bushes. A very favorable attitude has been taken by nurserymen regarding the destruction and non-sale of these bushes.

Scouting for the Disease

On the discovery of Blister Rust in northwestern Oregon, it was deemed advisable to make an inspection in northwestern California, It was logical to suppose that the disease might make its way down the Coast. Ten black currant plantings still remaining in Humboldt and Del Norte Counties were carefully inspected. These plantings ranged approximately from eight to 100 miles this side of the Oregon line along the Coast. About three miles from the line, approximately 100 R. bracteosum bushes over a distance of 300 yards were carefully inspected along a small stream. No signs of the rust were found.

Throughout the scouting season, the black currant plantings were inspected when found. Wild Ribes were occasionally looked over in different sections and a lookout kept for diseased sugar pines.

Educational Work

The successful prosecution of any campaign in the suppression or control of a pest or disease depends largely upon the educational propaganda put forth regarding it. This has been strongly brought out at several agricultural meetings in this State regarding local pests.

The educational work in the Blister Rust field has been more extensive this year than last. Better opportunities have presented themselves to carry on this phase of the program.

The agricultural fair is still, with one exception, the best agency to "sell" Blister Rust. Exhibits were placed at the National Orange Show in San Bernardino, the State Fair in Sacramento, the Ventura County Fair in Ventura, the Los Angeles County Fair in Pomona, The Yuba County Fair in Marysville, the Glenn County Fair in Orland, the Humboldt County Fair in Ferndale, and the Butte County Olive and Orange Exposition in Orovills. The Blister Rust film was shown at the State Fair in Sacramento and at the Ventura County Fair. This was rather a new departure, but proved to be highly successful.

In keeping with the spirit of Forest Protection Week, literature was sent to the 500 high schools of the State and to 17 County Superintendents of Schools in the northern part of the State.

Articles pertaining to Blister Rust were inserted in about 25 local newspapers where the work was being carried on. The 5-panel exhibit was set up in the more important centers of these counties.

The motion picture film was shown in 20 towns or cities. This continues to be the best agency for widespread publicity.

Circular letters and posters were sent to all the postoffices in the northern part of the State where eradication work had been or was

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Circular letters and [illegible] were sent to all the [illegible] in the northern part of the [illegible] with [illegible]

being done. The Southern Pacific and Western Pacific Railways took 225 posters to place in their stations.

It has seemed more advantageous up to this time to put on an active educational campaign in areas where the work was being done than to make it state-wide. Blister Rust is well known throughout the state, however; it is not uncommon to find in any section people in all walks of life, cognizant of this disease.

<u>Summary</u>

Black currants were removed in 10 counties: Mendocino, Tehama, Plumas, Sierra, Butte, Glenn, Lake, Sonoma, Nevada, and one half of Colusa. In addition, the northern half of Humboldt County left since 1924 was completed. A re-scout of Del Morte County revealed a few additional plantings. The total number of plantings found in 1925 was 223 comprising 1450 bushes; in 1924, 273 plantings with 1749 bushes. A total of these bushes with 4569 found in 24 nurseries makes a grand total of 7768 found thus far in California.

It is interesting to note the two black currant centers in Humboldt and Nevada Counties respectively. The one in the former is in a dairy section whose inhabitants are mostly of Scandinavian descent. The one in the latter is in a mining section whose inhabitants are mostly of English descent. It is not strange to find a concentration of bushes in these two areas because of the national taste of these people for this fruit.

Due to the presence of Blister Rust in Oregon, the California Department of Agriculture deemed it advisable to prohibit the entry of all currants, gooseberries, and five-needle pines from that state. Such action was taken September 25th.

<u>Future Plans and Work</u>

No particular change in the method of work is contemplated for another season. The eradication of black currants will probably be carried on to the south of the present area, taking in Marin, Napa, Yolo, Solano, Yuba, Sutter, Sacramento, El Dorado, Amador, Calaveras, Alpine, Mono, Tuolumne, and Mariposa Counties. It is the writer's opinion that it would be well to complete as soon as possible, those counties in the sugar pine belt. Some Changes may be made in the counties to be worked, but the above is recommended. (See map at end of report.)

Going hand in hand with the black currant eradication will be a second phase of the work, local control; in other words, local protection for California's sugar pines. Plans are now being formulated in conjunction with the U. S. Forest Service and the Department

of Forestry of the University of California to carry on a study of sugar pine reproduction and of different forest types. This will be followed by the eradication of wild currants and gooseberries where necessary. This work is contemplated for 1926 and will necessarily be of an experimental nature. How closely can the methods and practices be followed now in use in such work in Idaho and Oregon?

Appreciation

This report would not be complete without a statement of appreciation extended to the State Department of Agriculture and the State Board of Forestry for their cooperation in this season's work. This office is indebted to the U. S. Forest Service, the Office of Forest Pathology, the Departments of Forestry and Plant Pathology of the University of California, and to other Federal and State agencies for their aid and valuable suggestions. Thanks are due the lumbermen through the activities of the California Forest Protective Association, the nurserymen of California, and the Southern and Western Pacific Railways.

As a closing thought, the writer wishes to express a personal appreciation of the work of the late Harvey L. Paddock, who while a member of this office, met death by drowning last August. His personality, zeal, and conscientiousness made him a valuable man.

of Forestry of the University of California [illegible]
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[illegible]

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July 1, 1917

A. HOEN & CO. BALTO.

SCOUTING FOR THE DISEASE, EASTERN BRITISH COLUMBIA, 1925

During September, 1925, two men with an auto scouted for infection in the southeastern part of British Columbia. This scouting resulted in the location of four infections on *Ribes nigrum*, as follows:

Post Office	Number of bushes in planting	Number of bushes infected
Nelson (Willow Point)	95	10
Taglum	30	2
Harrop	35	8
Proctor	7	5

The following report by Mr. H. R. Offord will give the details of this work.

Report of Scouting in British Columbia September 9 to October 3 - 1925

H. R. Offord, Field Assistant

On September 9th the writer left official headquarters, Spokane, Washington to join R. L. MacLeod at Nelson, B. C., to scout for white pine blister rust to determine extent of spread. This year it was decided to concentrate on the area of B. C. that adjoins the panhandle of Idaho and part of Northeastern Washington. The country covered lies practically within the limits of a polygon formed by joining the points Grand Forks, Slocan City, Nelson and Cranbrook with Laurier and Eastport on the international boundary. Roads leading south between Grand Forks, Nelson, Creston, Yahk and the boundary were particularly watched for signs of infection.

This year infection was found at Nelson on both the north and south shores of the West Arm of Kootenay Lake, within the limits marked by Taghum on the west (4 miles west of Nelson) and by Proctor on the east (20 miles east of Nelson). No infection was found south of Nelson toward Salmo, nor was it found north of Nelson in the Slocan Valley (where the writer expected to find it and made very careful examinations). No infection was found west or east of these first two mentioned places - and in view of the fact that pine infection was found at Nelson, this year by H. G. Lachmund, it is possible that this marks a local spread within that district itself.

Eighteen scouting days were spent covering this area and 122 locations of cultivated black currants were examined. These

locations represented some 28,850 bushes (25,000 located in Atwood Nurseries, Grand Forks, and the remaining 3850 scattered over the entire area in small plantings). Actual miles travelled in B. C. by auto totalled 1180.

The majority of farmers and ranchers interviewed showed an intelligent interest in our problem and a great number of them would be willing to pull out their current bushes if the situation warranted taking those steps.

The work was performed by MacLeod and the writer working together. At each location the house was visited by one of us and permission obtained from the householder to examine his bushes, while the other scout started to work on the currants. This system seemed to work very well and in no single case did any rancher raise an objection about the work being done.

PINE DAMAGE STUDIES
CHEEKYE, B. C. - 1925

H. N. Putnam, Assistant Pathologist

This report covers the work done on the Cheekye Demonstration Area in 1925. Work done previous to 1925 is shown on page 4 of the 1923 Annual Report and on page 184 of the 1924 Annual Report.

Work done in 1925 on the Cheekye Demonstration Area will be discussed under the following headings:

I. Inspection of plot for Ribes.
II. Replacement of missing planted pines.
III. Inspection of planted pines for blister rust.
IV. Inspection of native pines for blister rust.
V. Topographic survey of Cheekye region.
VI. Patrol of area for fire.
VII. Burning of plot.

I. Inspection of Plot for Ribes

In the latter part of May, and early June, 1925, the plot was partly gone over for Ribes by a crew of 3 men spaced 6 - 8 feet apart. The fire guard also covered part of the area for Ribes in connection with his native pine data taking work. All of the area with the exception of the S. W. octant was covered for Ribes.

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VII. Burning of plot.

I. Inspection of Plot for Ribes

In the latter part of May, and early June, 1925, the plot was partly gone over for Ribes by a crew of 3 men spaced 6 - 8 feet apart. The fire guard also covered part of the area for Ribes in connection with his native pine data taking work. All of the area with the exception of the S. W. octant was covered for Ribes.

Table No. 6

Infection of Planted Pines,

May, 1925.

North Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
1R		22		.4	0
69R	22			.7	408
107R	22			.5	636
111R	22			.7	660
129R	22			.7	768
167R	22			.9	996
171C	23			.5	1020
175R	23			.5	1032

North East Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
* 8C	22			.7	48
30C	22-23			.5	174
54R	22			.4	318
*56C	22-23			.8	345
86L	22			.2	510
88L	23			.4	522
116R	22			.5	690
119L	23			.4	708
147C	23			.6	876
179L	22			.7	1068
185C	22			.7	1104
205C		22		.5	1237

East Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
1C	23			.5	0
12C	23			.7	66
*18R	22			.7	102
21C	23			.8	125
23L	22			.6	132
26L	22			.5	150
*27L	22			.5	161
27R	22			.7	161
30C	22			.5	179
31C	22			.6	184
33C	22			.4	197
33R	22			.5	197
*43R	22			.9	252
*45L	22			.6	264
50L	22			.8	299
67C			22	.6	401
70L	23			1.1	419
77C	23			.5	456
80L	22			.6	479
94R	22			.8	563
97L	22			.8	576
*109C	22-23			.6	659
114R	22			.5	678
121R	22			.8	720
135C	22			.6	804
176C	22			.9	1067
176L	22			.7	1050
*179C	22			.6	1085
185R		22		.8	1121
197L	22			.7	1176

South East Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
8C	23			.7	42
52C	22			.9	304
60C	22			.5	354
100L	23			.8	594
104L	22			.5	618
114L	22			.4	676
119L	22			.7	706
133R	22			.7	792
139L	22			.5	828
149C	22			.7	888
160R	22			.5	954
173C	22			.7	1032
198R	22			.7	1182
205L	22			.5	1224
210C	22			.7	1250

South Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
20L	23			.4	126
26L	22			.8	166
34R	22			.6	219
46R	22			.8	299
52L	22			.9	339
56L	22			.6	366
59R	23			.7	386
79C	22			.5	519
87L	22			.4	578
98R		22		.8	657
114C	22			.5	751
182L	22			.6	1204

South West Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
52R		22		.7	357
89L	22			.3	616
175L	22			.6	1200
178C	22			.8	1220

West Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
74C	23			.5	469
95R	22			.4	625
97L	22			.9	634
130R	22			.6	858
140C	22			.4	924

North West Radius

Pine No.	Yr. of Wood Infected			Ht. of Tree	Distance from Circum. (Feet)
	Discol.	Pycnia	Fruiting		
4C	23			.5	19
20L	22			.3	119
24R	22			.7	150
29C	23			.7	175
118L	22			.6	731
196C	23			.5	1219
198L	22			.8	1231

( ) - Circle around tree and year of wood infected indicates a doubtful case of blister rust infection.

* - Tree showed possible needle infection of blister rust in May, 1924.

Discol. - Discoloration stage of canker. This consists of a more or less circular discoloration at the base of a needle or around a needle scar. This is the first stage of blister rust noticeable on the bark of pines.

Pycnia - Second stage of canker. May appear as fresh pycnia, drops of thick, brownish glue like material on the bark, or it may show as dried pycnia, an irregularly shaped blackened area or areas.

Fruiting - Canker in fruiting stage, that is, producing aecia.

22-23 - Center of infection on node between 22 and 23 wood.

Table No. 1.
Ribes Found on N. E., S. E., and N. W. Quadrants
1925

Quadrant	Species	Date	Location	Size on Date found Ht.	Size on Date found F.L.S.	1924 Ht.	1924 F.L.S.	1923 Ht.	1923 F.L.S.	1922 Ht.	1922 F.L.S.	Remarks
N-NE	R. sang	5/30/25	24' S. E. of N 54°E on circumference	1.0	1.4	.9	1.1	.6	.6	.4	.4	Missed bush. Screened on 2 sides.
	R. lac	5/30/25	30' N. of pine 14 on east radius	.8	.8	.6	.6	.2	.2	.1	.1	Missed bush. Open.
	R. sang	5/30/25	85' S. W. of stake N. 78°E. on circumference	.4	.4	.2	.2	.1	.1	--	--	Missed bush. Screened 4 sides by shrubs and herbs.
E-SE	R. sang	6/6/25	7 ch. N. E. of pine 104 on S. E. radius	.3 .5 .7	.4 .5 .7	.2 .4 .6	.3 .4 .6	.1 .3 .5	.2 .3 .5	-- -- .45	-- -- .45	1 leaf infected out of 6 1 " " " " 6 2 leaves " " " 6 All above infections uredinial. — Growing near base of Alnus, Surrounded by Rubus.
	R. sang	6/6/25	6 ch. S. of pine 60 on east radius	1.0	1.0	.5	.5	.45	.45	.4	.4	Missed. Under end of log. 2 leaves infected (ured.) out of 7.
	R. sang	6/6/25	2 ch. N. of end of S. E. Radius	.5	.5	.3	.3	.2	.2	.1	.1	Missed bush. Open.
	R. sang	6/6/25	4½ ch. N. E. of pine 52 on S. E. Radius	.5	.5	.4	.4	.3	.3	.25	.25	Missed bush. Near end of rotted log.
	R. sang	6/6/25	12' S. of E. Radius 2' W. of circumference	.5	.5	.4	.4	.2	.2			Missed bush. Between two logs. 2 leaves infected (ured.) out of 8.
S-SE	R. sang	6/1/25	5 ch. E. of Pine 110 on South Radius	.9	1.1	.8	.9	.7	.7	.4	.4	Missed bush, near butt of upturned log.
	R. sang	6/1/25	4½ ch. E. of pine 140 on South Radius	.3	.3	.2	.2	.1	.1			Shoot from root left in spring of 1923
W-NW	R. sang	5/20/25	2' N. E. of pine 115 L. on West Radius	1.0	2.2	.8	1.7	.6	1.0	.0	.0	Held down by log. Cut off at base in 1923. Come up since then.
N-NW	R. lac	5/20/25	12' W. of Pine 100 R. on North Radius	.2	.2	.1	.1	--	--	--	--	Missed bush. Growing in vine maple.
	R. sang	6/8/25	4½ ch. N. E. of pine 52 on N. W. Radius	.9 1.1	.9 1.6	.8 1.0	.8 1.3	.7 .7	.7 .9	.5 .6	.5 .6	Missed bushes. Open 2 sides. Beside logs and bush.

Certain points are evident from an examination of Table No. 1.

1. Of the 16 Ribes bushes found, 5 showed uredinial infection on 8 leaves. No telia were found.

2. The largest Ribes found was a R. sanguineum 1.1 feet tall, with 1.6 feet of live stem. This was found on the N-NW octant.

3. The smallest Ribes found was a R. lacustre .2 feet tall, also found on the N-NW octant.

Tables No. 2 and 3, partly derived from Table No. 1, further analyze data in Table No. 1.

Table No. 2.
Total Ribes Found - 1925
by Octants

Octant	Ribes Species	Number Locations	Number Bushes	Total feet Live stem	Average No. Bushes per Location	Average Ft. Live Stem per bush
N-NE	none	none	none	none	none	none
NE-E	R. sang.	2	2	1.8	1.0	.9
	R. lac.	1	1	.8	1.0	.8
	Total	3	3	2.6	1.0	.85
E-SE	R. sang.	5	7	4.1	1.4	.59
SE-S	R. sang.	2	2	1.4	1.0	.7
S-SW SW-W	These two octants not covered for Ribes in 1925					
W-NW	R. sang	1	1	2.2	1.0	2.2
NW-N	R. sang.	1	2	2.5	2.0	1.25
	R. lac.	1	1	.2	1.0	.2
	Total	2	3	2.7	1.5	.9
Total Area	R. sang.	11	14	12.0	1.27	.86
	R. lac.	2	2	1.0	1.0	.5
Grand Total		13	16	13	1.23	.81

An examination of Table No. 2 shows the following conditions:

1. The greatest number of Ribes found in 1925 occurred on the SE quadrant. 54% of the total Ribes locations; 56% of the total Ribes bushes; and 42% of the total live stem was found on the SE quadrant.

2. The SW quadrant was not covered for Ribes in 1925.

3. No Ribes were found on the N-NE octant in 1925.

Table No. 3.
Comparison of Ribes Found
1923, 1924, 1925
by Quadrants

Quadrant	Ribes Found, 1923 No.	Ribes Found, 1923 F.L.S.	Ribes Found, 1923 F.L.S. per bush	Ribes Found, 1924 No.	Ribes Found, 1924 F.L.S.	Ribes Found, 1924 F.L.S. per Bush	Ribes Found, 1925 No.	Ribes Found, 1925 F.L.S.	Ribes Found, 1925 F.L.S. per Bush	% Efficiency 1925 By No.	% Efficiency 1925 By F.L.S.
N.E.	1484	17294.2	11.65	24	43.9	1.83	3	2.6	.85	98.21	99.73
S.E.	1857	13045.0	7.03	41	25.9	.63	9	5.5	.61	97.38	99.76
S.W.	640	10349.1	16.17	9	26.9	2.98					
N.W.	803	7324.4	9.12	9	5.3	.59	4	4.9	1.22	98.41	99.86
Total	4784	48012.7	10.03	83	102.0	1.23					
Total for NE, SE & NW Qt's	4144	37663.6	9.09	74	75.1	1.01	16	13.0	.81	97.87	99.77

The following points may be noticed in Table No. 3.

1. Since the S.W. quadrant was not covered for Ribes in 1925 it is not included in the comparison by years of the Ribes on the total area.

2. The percent of efficiency is not a true index of the efficiency of the eradication, because, in the two years since the first eradication, many seedlings came in and were found in 1924 and 1925, which had not started in 1923.

3. The % of efficiency is higher in every case by feet of live stem than by number of Ribes. This is due to the fact that the Ribes missed in 1923 were much smaller than those found in 1923.

4. There is a marked decrease in the number and size of Ribes, found in each of the three succeeding years. It is presumed that the number and size of Ribes found in later years would be lessened to a constant minimum. It is possible that a few Ribes would be found each succeeding year, due to seeding in, but that such Ribes would be so small that their infective potentiality would be nearly negligible.

II. Replacement of Missing Planted Pines.

On May 22, 1925, the planted pines which had died were replaced with pines of the same age from Wind River Experiment Station, Carson, Washington, the same source as the original pines. The pines planted in 1925 were labeled by means of an aluminum tag bearing that date.

Sufficient stock remained to permit the planting of a row of 60 pines spaced 6 feet apart in each of eight additional rows

radiating from the center. Each row, then was approximately 360 feet long. The locations of these radii was half way between existing radii as follows: N-NE; NE-E; E-SE; SE-S; S-SW; SW-W; W-NW; and NW-N.

Table No. 4.
Condition of Planted Pines.

Rad.	Pines Planted May, 10, 1923	May, 1924 % Pines Alive	May, 1924 Pines Planted	May, 1925 Planted Pines Alive No.	May, 1925 Planted Pines Alive Percent	1923 Pines Dead	1924 Pines Dead	Pines Planted May 22, 23, 1925
N	624	94.31	35	582	93.27	34	8	42
NE	621	89.21	67	565	90.82	46	10	56
E	622	95.82	26	587	94.37	32	3	35
SE	634	89.12	69	594	93.69	27	13	40
S	564	95.04	28	543	96.12	15	6	21
SW	538	76.39	127	434	80.66	52	52	76 *
W	562	76.69	131	438	77.94	59	65	114 *
NW	598	84.45	93	507	84.78	57	34	90 *
Total	4763	87.91	576	4250	89.23	322	191	474

*In the SW; W; and NW radii the total pines planted in 1925 are less than the number of dead pines being replaced. This is because many of the dead pines occurred in locations where there were such strong improbabilities of the pines living that they were not replaced in 1925. Conditions were particularly bad near the outer ends of the SW and W Radii, owing to a heavy windfall which occurred at some time since planting in 1924.

It is well to call attention to certain conditions evident in Table No. 4.

1. In the columns headed "1923 Pines Dead", and "1924 Pines Dead", the numbers listed refer to pines planted in these years dead from causes other than blister rust.

2. The percent of planted pines alive on the plot in May 1925 is slightly higher than in May, 1924.

3. A comparison of the percent of pines alive each year by radii shows a definite similarity. In each year the SW; W; and NW Radii showed decidedly the highest pine mortality, due probably to the poor planting sites on these three radii. The S and E Radii showed the highest percent of pines alive in each year.

Table No. 5, derived from Table No. 4, brings out the relative mortality rate of pines planted in 1923 and 1924.

Table No. 5.
Comparative Mortality of Pines
Planted 1923, and 1924

Radius	% of 1923 Pines Alive		% of 1924 Pines Alive
	1924	1925	1925
N	94.31	83.94	77.29
NE	89.21	81.80	85.07
E	95.82	90.68	88.46
SE	89.86	84.86	81.16
S	95.04	92.38	78.57
SW	76.39	66.73	59.05
W	76.69	66.19	50.38
NW	84.45	74.92	63.44
Average	87.91	81.15	66.84

Table No. 5 is derived in the following manner:

The percent of 1923 pines alive in 1924 is obtained from Table No. 4. It is obvious that the number of pines planted in 1924 represents the number of 1923 pines dead in 1924. Hence the difference between those planted in 1923, and those dead in 1924 equals the number alive in 1924. The number alive in 1924 divided by the number planted in 1923 equals the percent of 1923 pines alive in 1924.

The percent of 1923 pines alive in 1925 is obtained in a similar manner. The difference between the number of pines planted in 1923 and the sum of 1923 pines dead in 1924 and 1925 equals the number of 1923 pines alive in 1925. Hence, the number of 1923 pines alive in 1925 divided by the number originally planted in 1923 equals the percent of 1923 pines alive in 1925.

Similarly the percent of 1924 pines alive in 1925 is derived by dividing the number of pines planted in 1924 into the difference between the pines planted in 1924 and those dead in 1925.

From an examination of Table No. 5 certain facts are obvious:

1. A much higher percent of pines planted in 1923 survived one year than those planted in 1924.
2. On every radius except the NE a much higher percent of pines planted in 1923 were alive in 1925 than those planted in 1924.
3. The high mortality among the pines planted in 1924 is due chiefly to the fact that they were planted on the poorest sites, where pines planted in 1923 had been unable to survive.

III. Inspection of Planted Pines for Blister Rust

In the latter part of May, 1925, the planted pines were gone over carefully for signs of blister rust. Table No. 6 shows what was found.

An examination of Table No. 6 shows the following facts:

1. Only a relatively small percentage of the planted pines found to be infected in 1925 showed what was thought to be needle infections in May, 1924. This fact demonstrates the extreme difficulty of determining the presence or absence of blister rust from an examination of the needles in the field.

2. Data in Table No. 6 are analyzed in Tables 7, 8, 9, and 10, which follow.

Table No. 7
Infection of Planted Pines in
Fall of 1924 and Spring of 1925
Compared

Radius	Pines Infected Fall, 1924	Pines Infected Spring, 1925
North	1	8
N E	3	12
East	13	30
S E	3	15
South	2	12
S W	1	4
West	4	5
N W	1	7
Total	28	93

Note: Two of the pines on the west radius, Nos. 62C, and 143C found infected in the fall of 1924 were dead in May, 1925. Their death was caused by factors other than blister rust.

Table No. 7 shows an increase of over 3 times the number of trees infected in the spring of 1925 than were found in the fall of 1924.

Table No. 8.
Year of Wood Infected, and Stage of Infection
Infected Planted Pines, May, 1925

Radius	Year of Wood Infected	Pines showing canker stage			Total Pines Infected
		Discoloration	Pycnial Stage	Fruiting Canker	
North	1923	2			2
	1923-1922				
	1922	5	1		6
N E	1923	3			3
	1923-1922	2			2
	1922	6	1		7
East	1923	5			5
	1923-1922	1			1
	1922	22	1	1	24
S E	1923	2			2
	1924-1922				
	1922	13			13
South	1923	2			2
	1923-1922				
	1922	9	1		10
S W	1923				
	1923-1922				
	1922	3	1		4
West	1923	1			1
	1923-1922				
	1922	4			4
N W	1923	3			3
	1923-1922				
	1922	4			4
Total	1923	18			18
	1923-1922	3			3
	1922	66	5	1	72

Certain facts are evident from an examination of Table No. 8.

1. On nearly 94% of the infected pines, the infection was in the first, or discoloration stage.

2. Only one pine showed infection in the fruiting stage. This canker had just begun to produce aecia. Only one blister had formed.

3. Nearly 78% of the cankers occurred on 1922 wood. Since the pines were planted in May, 1923, from a disease free area, it is evident that the infections cound not have taken place before 1923. Lachmund and investigators in the East have determined that one year old wood is the most liable to become infected, hence a 1923 wave of infection would most heavily attack 1922 wood. It is most likely then, that the planted pines became infected in 1923.

Table No. 9.
Distance from Circumference of
Infected Planted Pines

Radii	No. of Infected Pines at Different Distances in feet from Circumf.												Ave. distance of Infected Pines from Circumference in feet.
	0-100	101-200	201-300	301-400	401-500	501-600	601-700	701-800	801-900	901-1000	1001-1100	1101-1250	Total	
North	1				1		2	1		1	2		8	690
N E	1	1		2		2	1	1	1		1	2	12	633
East	2	10	3		4	2	2	1	1		3	2	30	457
S E	1			2		1	2	2	2	1	1	3	15	763
South		2	2	3		2	1	1				1	12	468
S W				1			1					2	4	848
West					1		2		1	1			5	702
N W	1	3						1				2	7	521
Total	6	16	5	8	6	7	11	7	5	3	7	12	93	585

The following points are brought out in Table No. 9.

1. There is no great concentration of infection near the circumference.

2. Infected pines occur near the center on 6 of the 8 radii.

3. The average distance of infected planted pines on the eight radii is 585 feet, or within 40 feet of half the radial distance, since the length of a radius is 1250 feet.

4. The East radius showed the greatest number of infected pines. As an explanation of this fact, a glance at Table No. 3 shows that 85% of the total Ribes locations; 78% of the total Ribes bushes; and 68% of the total feet of live stem were found in the eastern half of the area in 1924.

Table No. 10.
Average Heights of Healthy and Infected
Planted Pines Compared

Radius	Healthy Trees		Infected Trees	
	Basis (Trees)	Average Height (feet)	Basis (Trees)	Average Height (feet)
North	114	.54	8	.61
N E	109	.50	12	.53
East	111	.55	30	.64
S E	113	.51	15	.63
South	105	.54	12	.63
S W	85	.47	4	.60
West	86	.47	5	.56
N W	98	.46	7	.59
Total	821	.51	93	.61

In the field all heights of planted pines were taken in tenths of feet. Table No. 10 shows the average heights of healthy and infected planted pines. In working up this report, owing to lack of time it was not possible to average the heights of all the healthy pines, hence, to eliminate the element of personal choice in selection of heights of pines. The heighth of every fifth healthy pine was counted to get the average height.

Table No. 10 shows a noticeable increase in the average height of infected pines over that of healthy pines. This amounts to about 20% of the height of healthy pines.

An interesting point is shown in Table No. 10. The SW, W, and NW radii, showing the lowest agerage heights of pines also show the lowest % of infected pines. In other words, it appears that the healthiest, tallest pines, even in the young age classes are the most exposed to blister rust.

IV. Inspection of Native White Pines on Plot for Blister Rust.

The study of infections on native pines begun in the fall of 1924 was continued in the spring of 1925 by five men, and by the fire guard during the summer of 1925. Each pine was plotted, numbered and tagged with that number. Each canker found was tagged and tabulated according to stage and year of wood infected. The work was not completed over the entire plot. There remains the S. W. quadrant and 2/3 of the W-NW octant to do. 2975 native pines out of about 5000 are finished.

An analysis of these data will be made in a later report.

V. Topographic Survey of Cheekye Region.

A topographic survey of the Cheekye region was begun in the fall of 1924. This survey was continued in 1925. It now includes the area lying east of the Cheakamus River to a line about ½ mile east of the plot; and south from Cheekye Creek to Brackendale. Contours were sketched in using a 10-foot interval.

VI. Patrol of Area for Fire.

In the summer of 1925 from June 1st to September 1st a fire guard patrolled the area for fire. He worked on the plot during spare time, collecting data on native pine infection.

No fires were discovered during the time he was employed.

VII. Burning of Plot.

On September 26, 1925, after the close of the official British Columbia fire season, the plot was completely burned over. The following quotation from H. L. MacLeod's letter describes the circumstances regarding the fire. It is extremely unfortunate that fire destroyed the plot just when it was beginning to yield results.

"On Saturday afternoon, September 26, several loads of logs standing near the watertank at A, in the logging camp, took fire evidently from a spark from the locomotive. Four loads which were burning were shunted across the river to the switch at B, which is, as you know, in the middle, or was, of a dry slashing. The locomotive then returned to the camp where several more loads of logs were burning. These were finally extinguished with the valuable assistance of the P. G. E. locomotive which arrived with a string of empties. In the meantime the logs which were left in the switch at B started the fire which did all the damage.

"Half a gale was blowing down the Squamish River, flying embers being carried several hundred yards so that Saturday evening the fire jumped the river, the track and the road and swept through our plot and on down as far as the cemetery on our side of the road. I am told that it did not get as far as the Brackendale Trail, though I was not in there. I have enclosed a very rough map to give you an idea of t the area swept by fire.

"It is a difficult matter to determine accurately the responsibility for a fire without a thorough investigation but from the several garbled, and in some cases contradictory, accounts of eye-witnesses I believe that poor judgment was shown by the fighters at the start and that equipment was totally inadequate to combat the blaze---camp equipment, I mean.

"To shunt four cars of blazing logs into a dry slash was to my mind, the height of folly but we must remember that when logs are blazing in the middle of a camp, quick action is necessary. However, had the camp been equipped with preper hose equipment (I don't know the law requirements) the logs could have been extinguished at the tank. They have a hose on the locomotive but could not use it effectively as the locomotive was on the same track as the cars. They tried to use the short hose on the tank which is used for filling the locomotive but this was ineffective. The P. G. E. locomotive came along and ran alongside some of the loads and extinguished them.

"The fire on the other side of the river, at B, was well away evidently when they tried to fight it. It is perhaps a debatable question as to whether it should have crossed the river or not. While there was a heavy wind blowing I have a feeling that had Mackay been there the fire would not have gotten away and crossed the river. Mac knew how to handle a fire and though he might not have arrived there in time, yet he would not, if he <u>had</u> been there, have left four loads of logs blazing with no one attending to them.

"However, Mackay was taken off on September 15, as the weather was dull and they had had one rain. After that the weather cleared and it has been fine ever since.

"When I went up the valley the fire was still burning down toward the river and over toward the Booth timber but was patrolled. It was smouldering and once in a while flaring up along the raod where the burn was irregular.

"I entered the plot on the west radius. The fire kept pretty well to the open slash so there is a little green left on the west side of the plot. The fire burned out to the road in patches leaving patches of green here and there. There are a few, very few, tagged pines standing in the west. Apart from that everything is gone. The wire is all

"Half a gale was blowing down the Squamish River, flying embers being carried several hundred yards so that Saturday evening the fire jumped the river, the track and the road and swept through our plot and on down as far as the cemetery on our side of the road. I am told that it did not get as far as the Brackendale Trail, though I was not in there. I have enclosed a very rough map to give you an idea of the area swept by fire.

"It is a difficult matter to determine accurately the responsibility for a fire without a thorough investigation but from the several garbled, and in some cases contradictory, accounts of eye-witnesses I believe that poor judgment was shown by the fighters at the start and that equipment was totally inadequate to combat the blaze---camp equipment, I mean.

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"I entered the plot on the west radius. The fire kept pretty well to the open slash so there is a little green left on the west side of the plot. The fire burned out to the road in patches leaving patches of green here and there. There are a few, very few, tagged pines standing in the west. Apart from that everything is gone. The wire is all

that remains of our work except for a few stakes. Here and there a patch of browned deciduous trees is left and all around--ash s."

VIII. Summaries.

1. Inspection of plot for Ribes.
   a. The Ne, SE and NW quadrants were covered for Ribes in spring, 1925.
   b. A total of 13 Ribes locations, 16 bushes, and 13 feet of live stem was found.
   c. The average feet of live stem of Ribes found on the 3 quadrants mentioned above was 9.09 in 1923, 1.01 in 1924, and .81 in 1925.

2. Replacement of missing planted pines.
   a. On May 22, 1925, a total of 474 pines from Wind River Experiment Station, Carson, Washington, were planted, replacing those pines which had died since the spring of 1924.
   b. Sufficient stock remained after replanting the eight radii to permit the planting of 8 rows of 60 pines each spaced 6 feet apart in the rows, radiating from the center and interspersed among the existing radii.

3. Inspection of Planted Pines for blister rust.
   a. In latter part of May, 1925 the planted pines were examined for signs of blister rust.
   b. A total of 93 infected pines were found, over 3 times the number of pines found infected in the fall of 1924.
   c. Nearly 94% of the infection was in the discoloration stage, and 78% of the cankers occurred on 1922 growth.
   d. One canker was found producing aecia.
   e. There was no concentration of infection on pines near the circumference. It was distributed along the radii.
   f. The east radius showed the greatest number of infected pines.
   g. The eastern half of the plot showed the largest number of Ribes missed in 1923.
   h. The average height of infected pines was 20% taller than the average height of healthy pines.

4. Inspection of native white pines on plot for blister rust.
   a. A total of 2975 native white pines have been numbered, tagged and plotted. Each canker found was tagged and tabulated according to stage and year of wood infected. Analysis of this work is not included in this report.

5. Topographic survey of Cheekye region.
   a. A topographic survey using 10-foot contour intervals has been completed for the area surrounding Cheekye Plot.

6. Patrol of area for fire.
   a. From June 1, 1925 to Septemberl, 1925, a fire guard

patrolled the area on lookout for fires. No fires were discovered.

7. Burning of plot.
   a. On September 26, after the close of the British Columbia fire season, the plot was burned over completely. The fire was caused by a carload of burning logs, evidently set from a spark from the locomotive.
   b. The plot was a total loss.

[illegible] res on lookout for fires. No fires were discovered.

[illegible] [illegible]

a. [illegible] [illegible] fire [illegible] The fire was caused by [illegible] the locomotive.

b. [illegible] was a total loss.

INSPECTION OF TRANSPORTED HOST PLANTS, IN COOPERATION WITH THE FEDERAL HORTICULTURAL BOARD.

C. R. Stillinger, Associate Pathologist.

During the past year no extensive changes in quarantine regulations as they affect the movement of host plants of white pine blister rust have been made. Due to the finding of blister rust in Oregon I have understood that California has placed a quarantine against the State of Oregon but no official notice has been received of such a quarantine. During this fall there has been a change of policy by the State of Washington in the interpretation of their state blister rust quarantines. During the previous season white pine was not allowed to be shipped into the coast region of Washington. During this fall season state inspectors are letting pine be shipped into and planted in the coast region. Up until this fall shipments of Ribes were not allowed to be made into the coast region unless they were completely defoliated and from a licensed and inspected nursery. During this fall our inspectors have called attention of state inspectors to several shipments bearing old leaves or small young leaves, but the state inspectors have allowed them to pass.

During the spring season one serious loophole was found in our inspection system, that is the state bridge between Vancouver, Washington and Portland, Oregon. It was discovered that during the flowering season for Ribes sanguineum, many autoists were accustomed to going into Washington and bringing back bunches of the flowering currant. Steps were taken immediately to place inspectors at the bridge and as a result 18 such cases were observed and proper disposition made of the plants. This situation develops the necessity of placing at least one inspector at the bridge during the flowering season of the plant in the spring.

However from a recent ruling of the solicitor, it appears that we exceeded our authority in carrying on this inspection work, and it appears that the only way that such shipment can be stopped will be by a state inspector. The following rulings by the Solicitor have been made:

> (1) Your inspectors have not the right to stop an automobile or other vehicle which may be engaged in carrying produce in violation of the Plant Quarantine Act:
>
> (2) The inspectors of this Department engaged in enforcing the Plant Quarantine Act have not the right to search automobiles or other vehicles because of the suspicion or even the certain knowledge that such vehicles are carrying quar-

antined plants or plant products; nor

(3) have they the right to take legal proceedings against occupants of automobiles or other vehicles merely because the occupants decline to stop their machines or answer the inspectors' inquiries.

The Solicitor said, further, that while he recognized the handicap under which our inspectors must labor he believed the law was clear on the subject. He said that in case our inspectors should obtain positive information that an automobile is carrying some quarantined article, their only legal mode of procedure would be to take the number appearing on the license tag and the name of the state issuing it, whereupon the proper state authorities, upon request, would advise as to the owner, and criminal prosecution might then be instituted under the Plant Quarantine Act.

Of course federal inspectors could make observations and where they observed the flowering currants, take the license number of the car and handle the matter in this way. It appears to be more feasible to have the work done ~~be~~ a local inspector.

Spring Inspection

Spring inspection was started at the usual points on about the Third of March and continued until the middle of May. About 30% more shipments were inspected during this period than for the spring of 1924. Table No. I shows the classification of the shipments that were inspected. About the usual number of violations were noticed. 50 violations in all were found, 34 being federal violations and 16 state violations. Table No. II gives the analysis of the violations that were found.

Table I.
Plant Shipments Inspected
Spring - 1925

Inspection Point	Period of Inspection	Number From: Eastern Quar. Zone	Western Quar. Zone	Not Quar. Zone	Number In-spected	Number Not In-spected	Number of Violations: State	Federal	Number Shipments Reported to States	Number Loose Parcel Post
					PARCEL POST					
Pasco	3/3 to 5/14	82	1,640	163	1,237	883			122	1,657
Pendleton	3/5 to 5/14	122	372	259	619	105			347	746
Portland	3/10 to 5/13	868	675	917	2,450		1	5	684	2,470
Ogden	3/16 to 4/25	122	30	136	110	141			9	126
Seattle	3/4 to 5/14	481	2,404	250	3,208		13	4	3	116
Spokane	3/4 to 5/14	8,117	957	1,669	9,918	544		1		2,608
Tacoma	3/2 to 4/30	284	364	119	767			1	111	470
	Total	10,076	6,442	3,513	18,309	1,673	14	11	1,276	8,193
					EXPRESS					
Pasco	3/3 to 5/14	246	2,191	299	2,248	478			874	
Pendleton	3/5 to 5/14	263	564	351	1,135	19		2	816	
Portland	3/10 to 5/13	310	209	201	720			1	492	
Ogden	3/16 to 4/25	171	425	122	320	400		1	65	
Seattle	3/4 to 5/14	81	879	148	1,097	1	2	2*	2	
Spokane	3/4 to 5/14	457	1,106	1,501	2,417	568			13	
Tacoma	3/2 to 4/30	26	333	65	422	2			8	
	Total	1,554	5,707	2,687	8,359	1,468	2	6	2,270	
					FREIGHT					
Pasco	3/3 to 5/14	8	95	101	146	49			50	
Pendleton	3/5 to 5/14	386	945	591	1,772	124				
Portland	3/5 to 3/13	13	12	14	28	9			34	
Ogden	3/16 to 4/25	4	4	13	4	15			3	
Seattle	3/4 to 5/14	1	105	29	97	39			4	
Spokane	3/4 to 5/14	37	74	139	114	104			8	
	Total	449	1,235	887	2,161	340			99	
					AUTO					
Pendleton	3/5 to 5/14	1	9	7	17				10	
Portland	3/5 to 5/13							18		
	Total	1	9	7	17			18	10	

*Carried by passenger on train.

Table II.
Quarantine Violations
Spring - 1925

Shipper	Transporting Agency	Federal Quarantine #26						Federal Quarantine #54						State Quarantines 7, 12, 13					
		Black Currants		Other Ribes		White Pine		Black Currants		Other Ribes		White Pine		Black Currants		Other Ribes		White Pine	
		No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plant
Nursery	Parcel Post															4	37		
	Express					1	25			2	5					1	18		
	Freight																		
	Unknown																		
Individual	Parcel Post	1	2	2	6					8	29					9	25	1	1
	Express			1	1					2	2					1	3		
	Freight																		
	Auto									18	73								
	Unknown																		
Total		1 - 2		3 - 7		1 - 25				30 - 109						15 - 83		1 - 1	

Violations Federal Quarantine #54 = 30 (No Pines)
" " " #26 = 5 (25 Pines)
" State Quarantines 7-12-13 = 16 (1 Pine)
51 (26 Pines)

No Tag = 22
? = 21
Tag = 8
51

Ribes Shipments = 49 of 201 plants.
Pine Shipments = 2 of 26 plants.
51 of 227 plants.

Fall Inspection

Due to the fact that many of the inspectors are unfamiliar with quarantine inspection work considerable difficulty has developed each season to get the men to follow the exact procedure as stated in the manual. In order to overcome this difficulty as far as possible, a school for inspectors was conducted at Spokane, Washington, during the first week in October. During this training period the new men worked with an experienced man in actual inspection work here at Spokane. Further they were required to study the blister rust quarantine regulations that are in effect and then these quarantines were discussed with them in order to clarify any uncertain points. They were then given prepared bundles containing theoretical violations and asked to write the case up completely. This proved to be a very effective method in clearing up in the minds of the inspectors the usual procedure. As a result of this preliminary training the usual minor difficulties which new men develop have not occurred this season.

Actual fall inspection work was begun at Spokane, Washington, on October 4th, and the other points, Pasco, Seattle and Tacoma, Washington, and Pendleton and Portland, Oregon, were started as indicated in Table No. III. Due to the dry fall very little nursery stock was observed until the latter part of the month. However, during the early part of November, there was a heavy movement of nursery stock. Inspection work was discontinued at all points in early December, except Portland, Oregon.

Eleven state violations have been noted. Five of these were returned or destroyed by the state inspector while six were allowed to go to their destination. These latter were cases moving from the eastern part of the state into the coast region. Only two violations of federal quarantines were intercepted. Both of these were shipments of white pine moving out of the State of Washington in violation of Federal Quarantine #54. Proper disposition was made of both of these shipments.

Table No. III.
Plant Shipments Inspected
Fall - 1925

Inspection Point	Period of Inspection	Number From: Eastern Quan. Zone	Number From: Western Quar. Zone	Number From: Not Quar. Zone	Number Inspected	Number Not Inspected	Number of Violations: State	Number of Violations: Federal	Number Shipments Reported to State	Number Loose Parcel Post
PARCEL POST										
Pasco	Oct.6-Nov.30	8	242	17	237	30			4	5
Pendleton	Oct.7-Nov.29	4	22	51	77					27
Portland	Oct.13-Dec.21	237	1447	212	1876	20		1		1203
Seattle	Oct.7-Dec.5	145	1776	1971	3702	190	7			2
Spokane	Oct.4-Dec.5	739	125	87	775	176				128
Tacoma	Oct.5-Dec.9	48	807	38	893				321	829
Total		1181	4419	2376	7560	416	7	1	325	2194
EXPRESS										
Pasco	Oct.6-Nov.30	52	298	112	462				26	1
Pendleton	Oct.7-Nov.29	29	53	198	280					
Portland	Oct.13-Dec.21	235	926	365	1360	166				
Seattle	Oct. 7-Dec. 5	273	1540	130	1813	130	4	1	14	
Spokane	Oct. 4-Dec. 5	104	186	147	424	13				4
Tacoma	Oct. 5-Dec. 9	9	355	37	401				170	
Total		702	3358	989	4740	309	4	1	210	5
FREIGHT										
Pasco	Oct. 6-Nov.30	1	14	28	39	4			9	
Pendleton	Oct. 7-Nov.29		1	10	11					
Portland	Oct.13-Dec.21	36	168	63	196	71				
Seattle	Oct. 7-Dec. 5		1	36	30	7			23	
Spokane	Oct. 4-Dec. 5	22	15	69	72	33			5	
Tacoma	Oct. 5-Dec. 9	12	4	6	22				10	
Total		71	203	211	370	115			47	

Table No. IV.
Quarantine Violations
Fall - 1925

Shipper	Transporting Agency	Federal Quarantine #26						Federal Quarantine #54						State Quarantines #7-#12-#13					
		Black Currants		Other Ribes		White Pine		Black Currants		Other Ribes		White Pine		Black Currants		Other Ribes		White Pine	
		No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants
Nursery	Parcel Post															2	4		
	Express															4	8		
	Freight																		
Individual	Parcel Post											1	1			3	8	2	4
	Express											1	5						
	Freight																		
Total												2	6			9	20	2	4

Violations Federal Quarantine #54 - 2 (6 White Pines)
" " " #26 - 0
" State Quarantines 7-12-13 - 11 (4 White Pines)
13 (10 White Pines)

Ribes Shipments - 9 of 20 Plants
Pine Shipments - 4 of 10 Plants
13 of 30 Plants

No tag - 12
Tag - 1
13

EXPENDITURES
WESTERN OFFICE OF BLISTER RUST CONTROL
January 1, 1925 to June 30, 1925

Project	Salaries	Subs. & other Expense	T. R.'s.	Autos, Personal	Automobiles. Rental	Automobiles. Oper'n.	Freight and Express	Supplies, etc.	Total.
1.1 Cultivated black currant location and eradication in cooperation with states									
1.11 Montana	$ 844.55	$ 175.56	$ 75.49				$ 3.11		$ 1,098.71
1.12 Idaho	415.91	413.52	59.23				1.56		890.22
1.13 Washington	314.00	241.50		$ 291.48				$ 10.88	857.86
1.14 Oregon	1,642.16	571.91	182.16	466.61			.85		2,863.69
1.15 California	1,755.00	832.53	78.66	1.96	$ 587.42	$166.25	10.38		3,432.20
1.2 Inspection of transported host plants in cooperation with the Federal Horticultural Board	2,870.11	1,028.90	164.22	29.26					4,092.49
1.3 Sanitation of nurseries									
1.31 Montana	416.67	162.21	60.00	284.57					923.45
1.35 California	443.50	127.48	181.07	10.99					763.04
1.9 Public information and cooperation in delaying spread of the disease	403.99	9.34	34.36				219.25		666.94
2.1 Testing and improving methods of control reconnaissance									
2.12 Idaho	225.00								225.00
2.2 Testing and improving physical destruction of Ribes									
2.22 Idaho	902.41	123.29	14.74					57.54	1,097.98
2.3 Testing and improving chemical destruction of Ribes	1,127.33	330.88	21.24	222.32			32.14	139.19	1,873.10
2.4 Ecological studies	488.67	80.79	99.79				12.07	93.65	774.97
2.9 Summarizing and making results available	1,750.00	276.31	317.13	12.60			1.88		2,357.92
3.1 Reconnaissance on Federal lands									
3.12 Idaho	1,065.01	224.00	78.40	110.53				116.82	1,594.76
3.2 Ribes eradication on Federal lands									
3.22 Idaho	2,834.54	612.49	66.88	24.01			111.36	209.44	3,858.72
3.24 Oregon	919.33	468.35			31.67	15.95		112.83	1,548.13
3.9 Public information, demonstration and service work									
3.92 Idaho	2,139.07	887.34	35.12	70.42			1.71	211.83	3,345.49
3.94 Oregon	202.50	43.75	99.00						345.25
4.2 Damage to pines	650.00	611.87	77.50				3.55	4.60	1,347.52
4.9 Publication of data	758.35	44.94	46.46						849.75
9.1 Supervision	1,800.00	142.58	322.90						2,265.48
9.2 Maintenance of field office	2,075.49	7.25						547.91	2,630.65
9.3 Miscellaneous supplies		62.23					232.93	1,194.05	1,489.21
Total	$26,043.59	$7,479.02	$2,014.35	$1,524.75	$619.09	$182.20	$630.79	$2,698.74	$41,192.53

EXPENDITURES
WESTERN OFFICE OF BLISTER RUST CONTROL
July 1, 1925 to December 31, 1925

Project	Salaries	Subs. & other Expense	T. R.'s	Autos, Personal	Automobiles Rental	Automobiles Oper'n.	Freight and Express	Supplies, etc.	Total.
1.1 Cultivated black currant location and eradication in cooperation with states									
1.11 Montana	$ 974.17	$ 522.16	$ 19.02	$ 577.94					$ 2,093.29
1.12 Idaho	706.66	762.11							1,468.77
1.13 Washington	1,356.00	1,141.01		1,175.37					3,672.38
1.14 Oregon	1,659.82	1,100.32	81.45	1,034.59					3,876.18
1.15 California	2,224.83	1,448.50	69.29	58.44	$ 628.87	$213.25			4,643.18
1.2 Inspection of transported host plants in cooperation with the Federal Horticultural Board	2,437.39	933.89	37.63	67.62					3,476.53
1.3 Sanitation of nurseries									
1.34 Oregon	261.67	90.94		76.21					428.82
1.35 California	433.34	70.64	30.00	18.97					552.95
1.9 Public information and cooperation in delaying spread of the disease									
1.91 Montana	450.00	22.10	9.00	28.21					509.31
1.99 Centralized activities	133.34	5.10					$ 28.07	$ 4.00	170.51
2.1 Testing and improving methods of control reconnaissance									
2.12 Idaho	217.50	6.20		56.35					280.05
2.14 Oregon	697.28	200.16	15.25	69.23		39.20			1,021.12
2.2 Testing and improving physical destruction of Ribes									
2.22 Idaho	2,172.84	769.51	9.50					378.96	3,330.81
2.24 Oregon	433.64	86.67	185.50	29.46				4.00	739.27
2.3 Testing and improving chemical destruction of Ribes	1,395.83	833.64	322.20				26.10	229.65	2,807.42
2.4 Ecological studies	1,883.48	644.60	200.70				8.53	208.22	2,945.53
2.9 Summarizing and making results available	310.00	12.20	39.00	4.76					365.96
3.1 Reconnaissance on Federal lands									
3.12 Idaho	3,382.07	1,122.42	121.67	161.07				158.02	4,945.25
3.14 Oregon	558.73	294.47		97.28				6.00	956.48
3.2 Ribes eradication on Federal lands									
3.22 Idaho	9,800.46	2,739.60	3.80	13.23			32.05	1,362.61	13,951.75
3.24 Oregon	2,878.41	622.70			140.00	15.49	3.77	415.92	4,076.29
3.3 Reconnaissance on private lands									
3.32 Idaho	3,053.50	634.86	53.08				2.06	185.53	3,929.03
3.34 Oregon	645.00	890.58	79.09						1,614.67
3.9 Public information, demonstration and service work	32.00	7.25	35.98					3.00	78.23
4.1 Spread of the rust									
4.11 Montana	670.84	251.75		191.24					1,113.83
4.12 Idaho	126.67	88.55	15.89	50.25					281.36
4.13 Washington	256.22	166.51		116.32					539.05
4.14 Oregon	661.25	341.96	34.50	261.72					1,299.43
4.15 California	316.66	148.62	58.46	43.16	75.00				641.90
4.16 British Columbia	208.34	291.67		30.52	135.00	36.64			702.17
4.2 Damage to pine	359.16	138.99							498.15
9.1 Supervision	1,900.00	85.70	434.59					8.00	2,428.29
9.2 Maintenance of field office	2,205.00							776.75	2,981.75
9.3 Miscellaneous supplies		89.43					90.96	788.78	969.17
Total	$44,802.10	$16,564.81	$1,855.60	$4,161.94	$978.87	$304.58	$191.54	$4,529.44	$73,388.88